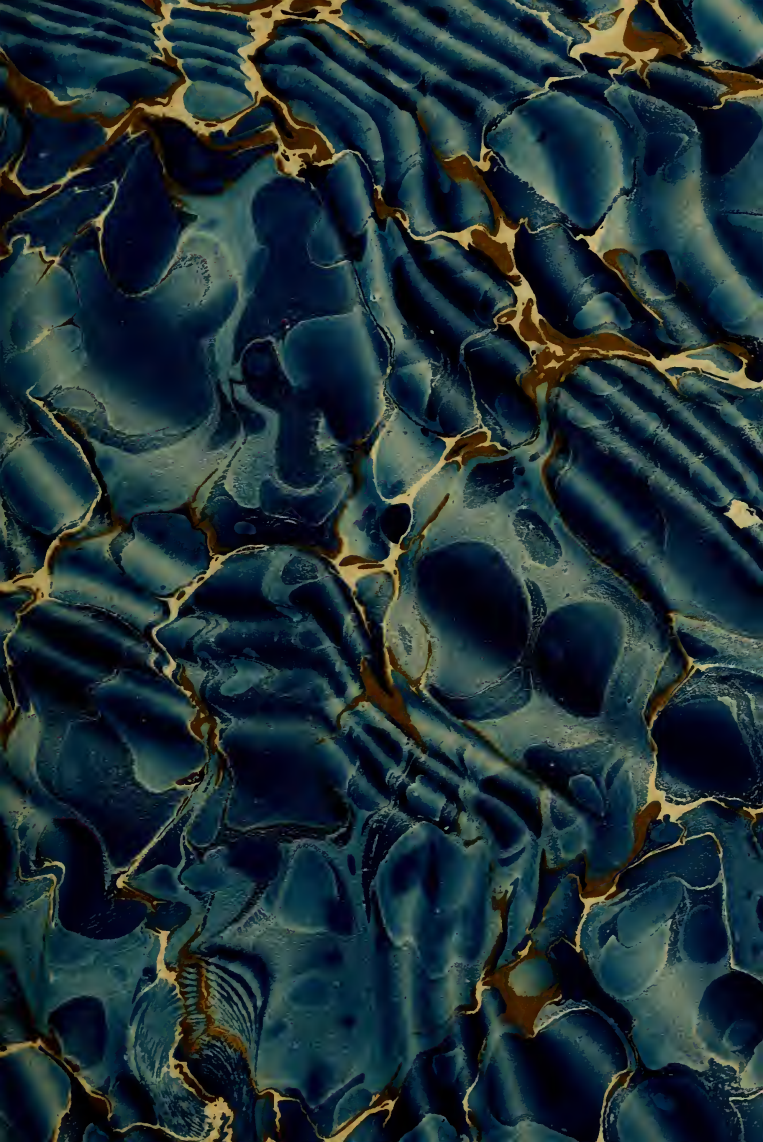

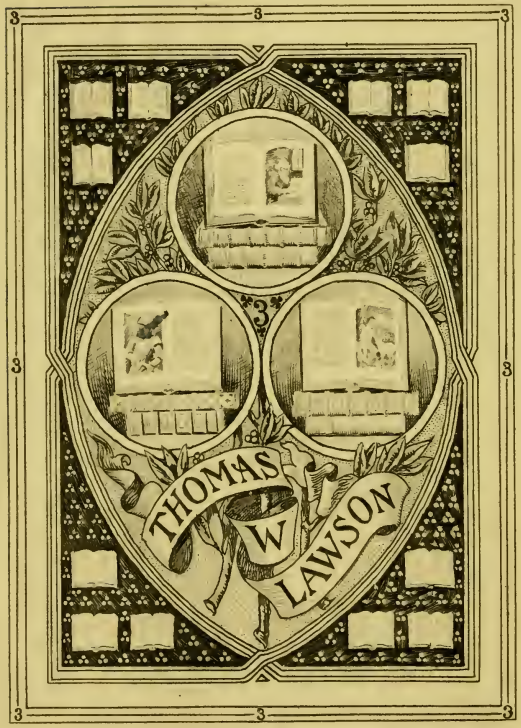
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THE DISEASES OF ANIMALS

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Fig. 1. Vigor and contentment,—the evidences of good care

THE DISEASES OF ANIMALS

A BOOK OF
BRIEF AND POPULAR ADVICE ON THE
CARE AND THE COMMON AILMENTS
OF FARM ANIMALS

BY

NELSON S. MAYO, M.S., D.V.S.

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and the State Veterinarian of Kansas

SECOND EDITION

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PREFACE

THE proper care of animals is more than supplying their physical needs and comforts. Animals are subject to ills and accidents. It is the part of every farmer to know how to care for the simpler difficulties, and when to call for advice from the veterinarian. The animal industry is rapidly increasing in extent and importance. The day of the skilled veterinarian is coming; but his profession must rest on a quickened public knowledge of the diseases and accidents to which animals are subject. The greater the knowledge of these subjects on the part of the man who raises animals, the keener is his interest in these and all related matters, and the more frequent will be his demands on the veterinarian. The day of the "horse-doctor book" is passing. Prevention, sanitation, careful handling are more important than mere medication. We are coming to a rational treatment of disease in animals, as we are of disease in man. Now that the farmer is giving so much attention to feeding and breeding, he should also give additional thought to the extra difficulties and ailments that overtake his flocks.

This little volume is based on an experience of some twelve years in Michigan, Connecticut and Kansas, as a practitioner, as a teacher of veterinary science to students in agricultural colleges, and as a lecturer before farmers' institutes. It has been the aim to give concise, practical directions that can be used by those who have to do with the care of animals. Special attention has been given to the use of domestic and simple remedies. Complicated medicinal treatment has been omitted, as not being practicable in ordinary hands. For the same reason, rare and unusual diseases are omitted because of the danger of confusion.

The writer will be glad to receive suggestions from those into whose hands this book may fall, as to measures that will make it more useful and practical.

NELSON S. MAYO

MANHATTAN, KANSAS,
October 1, 1903

NOTE TO THE SECOND EDITION

This book was first issued under the title, "Care of Animals." The name is now changed in order that the contents of the book may be better expressed. There is no change in the text.

L. H BAILEY.

ITHACA, N. Y.,
March 31, 1906

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THE CARE OF ANIMALS

CHAPTER I

GENERAL ADVICE

Domestic animals are kept under conditions that are more or less artificial,—conditions created by man and largely under his control. These conditions may be conducive to the good health and utility of animals, or if neglected or improperly attended to they may prove injurious; and they are frequently the active agents in the production of disease.

Wherever animals are gathered in large numbers there is an increased tendency toward contagious and infectious diseases, and extra precautions must be taken. It has been stated by some writers that the function or economy of disease-producing germs is to prevent an undue population of the earth. The fact that contagious diseases are most prevalent where numbers of animals are gathered, where hygienic and sanitary rules are not enforced, and where ignorance prevails, tends, at least, to enforce this conclusion, and to show that, in the main, "the fittest survive."

In the care of domestic animals, the old adage that "a stitch in time saves nine" is applicable, for it is much easier and more economical to prevent diseases

than to cure them. A man who understands the wants and needs of domestic animals, and who uses good judgment and care in dealing with them, is amply repaid in the profits and satisfaction returned.

One of the first essentials to the successful care and handling of stock is suitable quarters. The quar-

Fig. 2. The old-time barn and yard, in which shelter is inadequate and much of the manure is wasted

ters should protect from the inclemencies of weather, both in winter and summer. They should be light, dry and well ventilated. Dark, damp and poorly ventilated stables are hotbeds of disease. Light and an abundance of fresh air are essential to the maintenance of health; and these can be so cheaply supplied that no excuse can be offered for the lack of them.

Cleanliness is another very important factor, for the excrements of the animal body are not only injurious themselves, but they afford a breeding-place for bacteria, and in the processes of decomposition give off noxious gases. The common practice of stabling animals over manure-pits is not beneficial to the health of animals, however convenient it may be. Modern veterinary hygiene, both in theory and practice, follows human hygiene very closely. In cases of doubt as regards hygienic or sanitary conditions, it is a good plan to put yourself in the animal's place. Fig. 2, while interesting as a picture, shows some of the conditions to avoid.

The temperature of stables and barns is an important matter. Many modern stables are too warm; the old-time ones are likely to be too cold. Too high temperature produces lassitude, reduces appetite and tends to breed germs. Too low temperature prevents the animal from making strong and continuous growth; the food energy that would otherwise go to the building up of the body is consumed in merely keeping warm. As a rule, a temperature of 45° to 50° is best for most animals in winter.

FEEDING AND WATERING

More animals are injured by overfeeding than by underfeeding. It is mistaken kindness to feed animals merely because they will eat. Under ordinary conditions, animals should be given only sufficient food to keep them in fairly good flesh. Animals

that are fat are susceptible to disease, do not breed readily, do not endure well in parturition, nor perform ordinary labor easily. It is a somewhat common practice, when severe exertion is required of a horse, either at draft or on the road, to give him an extra heavy feed. Such practice is injurious to the animal, as he cannot do his best work when the digestive system is overloaded with food and thus taxed to its utmost capacity. Animals of which hard work is expected should be fed sparingly. Of course, horses or other animals that are continuously at hard labor should be given food enough to keep them in good physical condition.

When warm, and especially when tired, an animal should be allowed to rest before receiving its usual food. The overtaxing of organs already tired tends to bring on diseases of the digestive system. It is usually a good plan to water the animal sparingly at first and give a light feed of hay; then, when it is cool and rested, to give what water is desired and the customary feed of grain. Rubbing an animal with a brush, cloth, or wisp of straw is an excellent method of resting and soothing it when it is tired and nervous.

When animals are fed out of doors or in pens it is best to have them divided into small groups, or to have individual places for feeding each animal. The food should be so distributed that each animal has opportunity to get its fair share. When this is not done the strong and aggressive animals are likely to keep the weaker ones from getting their share of

the food, while they themselves may eat more than is good for them. The same general principles hold in watering animals; every opportunity should be given for the weaker ones to get sufficient water; otherwise the "bosses," after obtaining what water they wish, will often keep other animals away. Experience has demonstrated that, in feeding calves or similar animals, they do much better when each is kept in a stall or stanchion by itself, at least during the feeding period. Calves herding together frequently suck one another's ears or other parts of the body to such an extent that it interferes with their growth.

In feeding young animals, cleanliness is of the greatest importance, especially for those that are fed milk or similar foods, which soon decompose. Not only should the food be sweet and pure, but the pails, troughs and other utensils should be kept scrupulously clean. All food that the animal does not consume should be removed, and not allowed to decompose. The food for young animals is often fed in a too concentrated form. Much better results can be secured by diluting the food and feeding more frequently.

For horses at ordinary work, oats and bright timothy hay constitute an excellent diet. When horses are at hard labor, an addition of cornmeal is excellent to make up for the increased waste. For such horses, and for old animals whose teeth are not in good condition, better results are secured if the corn and oats are ground together.

Animals should be fed regularly, and then watered

before receiving grain. Bulky food, or that containing a large amount of indigestible substance, should be fed to horses sparingly. Cattle and sheep are not so easily injured by it, since they have greater digestive capacity. Musty or dusty hay fed to horses is likely to produce indigestion or heaves; and it is often a source of much trouble to other animals. Moldy and wormy food is often the cause of a serious brain disease among horses and mules; and moldy ensilage sometimes poisons cattle.

Grasses or grain often contain ergot, a parasitic fungus, which shows itself among the healthy grains as long black kernels. This fungus most frequently attacks rye and related wild grains. The feeding of this "spurred rye" to animals is likely to produce in them a disease called *ergotism*. In this disease the blood-vessels of the extremities contract to such an extent that the feet of the afflicted animals frequently slough off, and sometimes, also, the tails. Corn-smut, so far as known, does not cause disease. If fed in large quantities, however, it is likely to produce indigestion.

Underfeeding is a result of insufficient food, or of food that is not sufficiently nutritious and digestible. As a result of underfeeding, animals fall away in flesh, become "hidebound," and the coat takes on a harsh and lusterless appearance, which is caused by the absorption of fat from beneath the skin. A similar appearance may also be produced by disease. In bringing underfed animals back into condition, care must be taken not to overfeed. It is best to increase

Fig. 3. Salting the sheep

the rations very gradually, so that the digestive system may adapt itself to the change.

Sudden and violent changes of food are always to be avoided if possible. When it is necessary to change the food, this should be done gradually, and the new food should not be taken on an empty stomach. If a horse is to be turned out to pasture, it is better that he have a feed of hay and grain before being let out,

as then he is less likely to gorge himself on the new diet. Fresh grass usually acts very beneficially on an animal, improving the tone of the whole system. A variety of foods generally gives the best results. Animals at severe work rarely keep up in flesh if fed chiefly on green succulent food. Palatability of food,—that is, agreeable taste,—is also very important.

Common salt is essential to practically all domestic animals, and it should be given to them frequently. If animals are allowed free access to salt they eat only what nature requires; but to animals not accustomed to it, salt must be supplied very gradually, or they will eat too much at first and are likely to be overtaken by indigestion or even death. Sheep are sometimes poisoned by eating too much salt when they are not accustomed to it. Fine or rock salt may be used. Every good farmer knows that he must salt his sheep often (Fig. 3).

"Bolting" the food, or gulping it rapidly and without sufficient mastication, is always injurious to animals. Some horses acquire this as a habit, and it is hard to overcome. One of the best methods of preventing it is to spread the grain over a large area, as on the bottom of a manger, so that the horse cannot easily obtain large mouthfuls. There are iron feed-boxes, divided into small compartments, that accomplish the same results. Smooth round stones, the size of a man's fist, can be placed in the ordinary feed-box, so that the horse is required to nose them over in order to get the grain. Animals that bolt their food should be given ground feed.

Fig. 4. Good stable yards, where milch cows may exercise

Fig. 5. A pen of good fattening pigs

EXERCISE

Exercise is important in maintaining the general health and vigor of animals. The practice of keeping milch cows closely confined the year round, while conducive to an increased milk-flow, also

Fig. 6. A good Yorkshire pig

tends to weaken the animals' constitutions, and predispose them to disease, especially to tuberculosis. Exercise is necessary to keep the muscles, digestive system, skin and other organs of the body in a healthy condition. But animals that are being fattened for the market should have very little exercise, as exertion consumes some of the food that should go

Fig. 7. Young Galloway bulls

toward the making of fat. Cow barns should be provided with ample yards, placed in such position that they are well protected from winds (Fig. 4). In severe weather, cows should be exercised under cover, as in a covered barnyard.

PROTECTING THE ANIMALS

Animals that have to be exposed to severe weather should be protected by means of blankets, especially when allowed to stand while sweating after severe exertion. This is especially true of horses during cold weather. The best and most economical horse-blankets are the large, square, all-wool kinds. They should always be securely fastened on by means of straps or large blanket pins. During the summer, horses that are subjected to severe exertion, which causes them to sweat freely, can be protected from drafts and from

danger of taking cold by light thin blankets, commonly known as "steaming blankets."

In localities where flies and mosquitoes abound, it is economy to protect working animals against them by the use of fly-nets; as the irritation of the animal,— to say nothing of the driver,— in fighting the pests, will be a serious loss of energy and nerve force.

GIVE THE ANIMAL YOUR PERSONAL ATTENTION

A sleek, well-fed, contented-looking animal is not often the result of accident. It is the product of good care. The successful stockman is the one who likes his animals. He will sacrifice his own comfort rather than theirs. He will not stop with a half hour's

Fig. 8. Good Galloway cattle at pasture

Fig. 9. Fat cattle ready for market

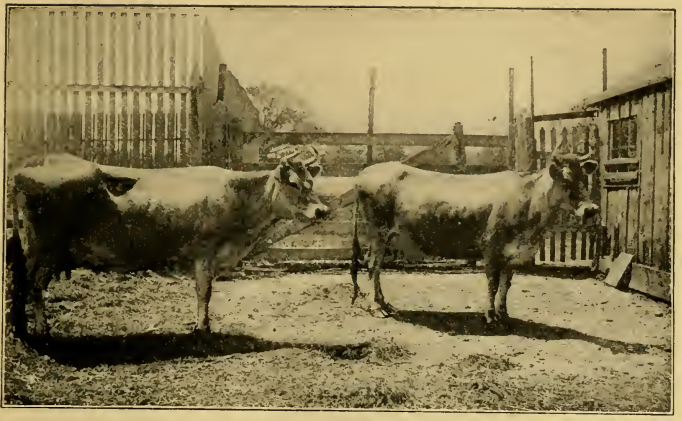

Fig. 10. Jerseys in good milk condition

Fig. 11. Merinos in good stock condition

grooming of his horse if the animal needs an hour's. "What do you give your horse to make him look so fine?" the traveler asked of the English farm lad. "Lot's o' rubbin', sir," was the reply.

The best of food, the fanciest stables, the most expensive implements and equipments, will not make up for the lack of good loving care. These are more than medicine or breed. Do not wait until your animal runs down before you inquire what ails him. It is better not to let him run down.

Many persons do not know what a good animal is, even though they raise animals all their lives. Sleek, plump, close-haired, clean, docile, contented,—these are some of the words that we apply to animals that are well cared for. Scrawny, rough, restless, wild, dirty,—these are attributes of those that are poorly cared for. The accompanying pictures (Figs. 3–11) show good farm animals. Poor farm animals are so common that pictures of them are not needed.

CHAPTER II

THE CARE OF ANIMALS IN STABLES AND YARDS

Aside from the necessity of stabling animals to protect them against inclement weather, it is often desirable to confine them for other reasons. Stabled animals are usually more gentle to handle, and their coats are improved in texture and appearance. The following brief remarks on stabling, however, are made from the veterinarian's point of view.

In the construction of stables, strength, simplicity and plainness should be emphasized. Under these conditions, the stables may be easily cleaned and disinfected.

The animals should stand, if possible, with their heads toward the center of the building. This arrangement of stalls provides better ventilation and also better lighting, as the light should be admitted, whenever possible, from behind the animals. In man and beast, sight is impaired by having to face a glare of light. With the larger animals, such as horses and cattle, it is best to confine them in separate stalls, where they can not get their heads together. There should be a sufficiently strong partition between to keep them from turning crosswise and interfering with their neighbors. Animals that are not properly separated often fall into the habit of fighting each other. The feed-boxes should be so arranged that each animal is fed sepa-

rately, and is prevented from consuming another's food. Such an arrangement insures each animal a given amount of food, and it tends to prevent the spread of dangerous undetected diseases, as tuberculosis among cattle and glanders among horses. The front of the stalls should be built no higher than is necessary to keep the animal properly confined and to place the food within reach. When the animal is standing the expired air will pass out over the front of his stall.

HORSE STALLS

The size of stalls for horses must depend somewhat on the size of the animal to be confined. For ordinary horses the stalls should be at least five feet wide; five and a half to six feet is better. They should be nine and a half feet long. For flooring, hard wood two inch planks, well matched, are excellent. Some hard woods are too slippery, however, and hemlock may be used. The floor of the stall should have a very gentle slope to the rear, the plank running lengthwise of the stall. It is more convenient to have the flooring of the passageway behind the animals at right angles to that of the stall, as it is easier to clean. The partition separating the stalls should be strongly made, well set and smoothly ceiled on each side. The rear of the partition should be well rounded. The feed-box and manger may be of iron or hard wood; if of the latter, the edges should be protected with strips of iron securely screwed down to prevent the animals from gnawing the wood.

Horses are best confined in stalls by means of stout leather halters, which can be tied to the railing or to any suitable place on the manger or side of partition. The tie should be secure and short enough to prevent the possibility of a horse getting a foot over the halter strap. An excellent method is to pass the halter strap through a rope or ring or over a pulley, and attach a light weight to the other end; this always keeps the rope taut enough to prevent accidents of this nature. In some cases, where animals do not stand well when tied by the head, they can be confined in the stall by a chain fastened across behind the animal; this is also a good method of preventing the animal from backing and lying down in the manure.

When room can be afforded, box stalls are desirable. These may be as much as twelve feet square, although ten by ten is a good size. In all horse stalls, provide high walls or partitions for kicking animals, three and a half to four feet high.

COW STABLES

The general arrangement of a cow stable, from a veterinarian's point of view, should be similar to that of a horse stable, except that cement can be used more satisfactorily for feed-troughs, passageways and gutter behind the cows. Cement passageways for horse stables do not stand well on account of the danger of being cut up by sharp calks on the shoes. They are also likely to be slippery at times.

The length of stalls for cattle must depend on the

size of the animals. For small cows of the dairy type the length of stall from the manger to edge of gutter should be from fifty-six to sixty-two inches; and for the larger beef breeds seventy-two inches. The flooring of the stalls should be planks, well matched, running lengthwise of the stall and having a slight incline to the rear. The gutter behind the stall should be from four to five inches deep and about fifteen inches wide. The edge of the gutter next to the stall should be vertical; otherwise animals are liable to slip when stepping on it.

The width of the stall should vary, according to the size of the animal, from thirty-eight to forty-five inches. There should be a partition extending far enough back to keep the animals from fighting each other and from turning crosswise of the stall so as to interfere with the neighboring animal or to soil the adjoining stall. In the narrower stalls for milch cows, it is an excellent plan to have the partition hinged near the cow's shoulder, so that the rear portion can be unhooked and swung aside or raised to give more room for the milker.

The manger should be as low as convenient, and should be so divided that the food of each animal is kept in a separate compartment. In the stabling of cows, each animal should have her own stall assigned to her, and she should not be shifted from place to place.

Cows are fastened in stalls in various ways. Some of the swinging or chain stanchions give good satisfaction. An excellent method is merely to stretch a chain across the rear of the stall. This is a cheap and effi-

cient method if the stall is built of proper size; and it keeps the animal from being soiled by the droppings. Another economical and satisfactory method is to use a neck-strap to which a ring is fastened; through this ring a chain is passed from one side of the manger to the other, crosswise of the stall, and held in place by a slipping bolt; by means of a rope attached to this bolt and fastened to a lever, all the animals in a row can be released at once.

The drainage from stables, especially from cow stables, should be kept on the surface, as underground drains clog easily with the coarse material that is used for feed and bedding. Preferably, there should be no drainage of urine, for it should be absorbed in bedding for use as a fertilizer.

THE GROOMING OF HORSES

In most respects the skin of animals resembles that of man, except that it is more densely covered with hair for protection. This affords a place for the lodgment of dust and dirt, which is frequently retained by coming in contact with the perspiration. Dirt frequently collects upon the skin and coat of animals from lying down, either in the stable or out of doors. In order to improve the appearance of an animal, and to contribute to its general health, the skin should be cleaned frequently. This is best done by means of a good bristle brush. In addition to this tool, a metal comb is required for the purpose of loosening such hard material as cannot be removed

with a brush. Combs, however, should be used lightly and only for the purpose of removing dirt. The essential part of grooming is to apply the bristle brush vigorously. This removes the accumulated dirt and dried perspiration, gives the coat a glossy appearance, and prevents various parasitic diseases of the skin. If possible, grooming should be performed after animals have had exercise, as the perspiration produced by the exercise is then removed instead of being allowed to dry on the skin. This is especially important when the skin and coat are soiled with mud or water. After the coarse dirt is loosened by means of a curry-comb, it should be completely removed with the brush; and, after brushing, the loose dust can be removed from the outside of the coat by wiping with a slightly dampened cloth.

The manes and tails of horses can be cleaned by using a very coarse comb and then thoroughly brushing with a mane brush, working on a small part of the mane or tail at a time. Curry-combs and finer combs should not be used upon the mane or tail, as they pull out and break off too many hairs. The mane and tail should be washed once in two weeks, care being taken to clean the skin thoroughly by using warm soft water and some mild soap; after washing the hair, brushing it out straight and drying it, a little bland oil or vaseline should be worked into the skin to keep it soft.

In warm weather, when horses are brought in wet with perspiration, it is often a good plan to rinse them off thoroughly with water from which the chill

has been removed. Then with a slightly curved stick, commonly called a scraper, the dirt and sweat can be thoroughly removed. The skin should then be rubbed dry with rubbing cloths and the hair brushed down straight.

THE CLIPPING OF HORSES

When horses are kept in comfortable stables during the winter, and are well protected against cold by stable blankets while in the barn and by street blankets while standing out, there is no serious objection to clipping them. It improves the appearance of the horse and his coat is more easily kept clean. Horses with long, thick coats should be clipped, as they usually sweat easily and their coats hold the moisture, so that if the animal is allowed to stand it is liable to take cold. If horses are clipped twice a year, the operation should be performed the first time soon after the hair has grown out in the fall. This allows them to become accustomed to the change before cold weather sets in, and it also allows for some growth of hair before winter. They should be clipped the second time in early spring, as soon as the weather begins to get warm and before the winter coats begin to be shed.

When horses cannot be protected from the cold, either in the stable or outside, they should not be clipped in the fall; but the long hair on the legs, as far as the knee and hock, may be removed. This is particularly important in horses that are required to work in mud, as the legs are much more readily

kept clean, and diseases such as scratches, mud fever and others, all caused by irritation from mud or dirt, are prevented.

THE CARE OF THE FEET

The feet of animals should be looked after frequently and all accumulations of dirt removed. This is especially important with horses. Their feet should be examined and scraped out in the morning before being sent to work and at night after returning, as it is very common to find foreign bodies, such as nails and stones, either driven into the wall or sole of the foot, or collected in the clefts of the frog or between the bars and the frog. If the hoofs show a tendency to dry out and become hard and brittle they should be softened with some good oil or hoof ointment. If they are ragged and tend to split, they should be rasped on the edges and trimmed until smooth. When animals are closely confined in stalls, especially on bedding, the hoofs grow out long; and if not treated they will deform the animal and make traveling extremely difficult. This condition is often observed in sheep, cattle and horses when they do not get exercise enough to wear away the horn as rapidly as it grows. The hoofs of such animals can be trimmed by paring them with a knife, or, better, in most cases, by using hoof-paring instruments which are made for farriers. These resemble in construction a pair of pincers. In paring hoofs, care should be exercised not to cut them too short,

as the animal is likely to become footsore. The hoofs of colts should be examined often to see that they are growing symmetrically. It sometimes happens that a piece is worn or broken from one side of a hoof, and this throws the weight of the body in such a way as to bring a strain upon the joints, that causes deformity or disease. In trimming hoofs, the outside of the wall should not be rasped or cut away, as it naturally forms a protective coating over the hoof.

BEDDING

Animals that are confined in stables through the night should be well bedded with some material that will not only make a comfortable place for them to lie on, but that will keep the animal clean and dry. If possible, a bedding should be used that will absorb moisture and help to keep the quarters clean. Bedding should be free from chemical substances or irritants that are liable to injure the skin or feet, or that would be injurious to the animal if eaten. Among good substances used for bedding are straw, shavings, coarse hay, sawdust, peat moss and tan bark.

The bedding in the stall should be spread so that most of it is fairly well forward, as there is a tendency for it to work backward with the movements of the animal. Heaping the bedding in the center of the stall should be avoided, in order to prevent the animals from getting cast. Rye-straw makes excellent bedding. It is bright and clean, is easily handled and wears well. The bedding should be removed from stalls in

the morning, and, if possible, spread in the sun where it can be thoroughly dried; this not only purifies the bedding but puts it out of the way while the stall is being thoroughly scraped and aired.

CARE OF SWINE

In the rearing of swine it is important that they be not closely confined, except when they are being fattened for the market. If possible they should be allowed a large range, with much green food. Swine belong to the class which is known as omnivorous animals, because of the great variety of food, both animal and vegetable, that they eat. As a rule, swine do not thrive well when closely confined, or when fed largely on one kind of food. They may increase in flesh, but their systems seem weakened and predisposed to disease. Swine should be changed frequently from pasture to pasture, and the runs should be so arranged that the animals have plenty of clean water to drink. In summer they should have some protection against the sun. In winter it is necessary to give them protection against cold, as the hair and bristles are a very poor protection.

If allowed access to straw-stacks swine will burrow into the straw and secure protection in this way, but such stacks should be destroyed at the end of each season. It is still better if the straw is changed once or twice during the winter. When special pens are built for swine, they should be so arranged that they can be easily and thoroughly cleaned. Cement answers

well for a part of the floor, but in those parts in which the animals sleep and in which young pigs are kept, a well-matched plank floor is better. Young pigs that are kept on cement floors are likely to suffer from lameness and enlarged joints.

When a large number of swine are kept, it is best to have them divided into separate lots, and not to confine very many together. They should be given a variety of food and allowed access to fresh, clean earth. There is often noticed in swine a disposition to eat dirt; this indicates a craving for mineral substances. This appetite can usually be satisfied by a mixture of one part of common salt, two parts of air-slaked lime, one part of sulfur, two parts of charcoal, and one part of wood-ashes. This mixture should be placed where the swine can get it freely. In case garbage or swill from cities is used, care must be taken in its feeding, as such material is likely to contain substances that are poisonous. Garbage or animal food that is badly decomposed is also likely to contain poisons. Swine need clean wholesome food, as well as other animals.

In case swine are confined in permanent buildings during the winter, the quarters should be thoroughly cleaned, disinfected and whitewashed as soon as the animals can be turned out to pasture.

It is often an excellent plan to have some rubbing-posts in the yards where swine are kept. Old cloths tied to these posts and kept saturated with crude petroleum furnish excellent means for ridding the hogs of lice.

YARDS AND CORRALS

Yards and corrals in which animals have been confined for feeding or other purposes should be thoroughly renovated at least once a year, preferably in the spring. All manure, litter and rubbish should be removed, and puddles should be drained or filled. If any loose earth remains it should be carried away; but if this is not possible it can be stirred several times by means of a harrow or hoe, to allow the sun free access to it. If any sheds exist, they should be thoroughly cleaned and a coat of whitewash or other disinfectant applied. Allowing the yards and corrals to remain unoccupied through the summer is an excellent method of disinfecting. Weeds should not be allowed to grow in the yard.

QUARANTINE

Quarantining is the separating and isolating from healthy animals of those suffering from a contagious or infectious disease. Whenever there is suspicion of a contagious disease the animals should be quarantined until the nature of the disease is known. Healthy animals should be removed from those that are suspected, and taken to quarters where no sick animals have been confined. This is better than to remove the sick animals from the healthy, leaving the latter in infected quarters or on ground that may have become infected from the excretions of the sick animals.

Care should further be taken that the healthy animals are not exposed by means of infected food, water-

ing places or feed-boxes. The sick animals should be separated from the others by some distance, and their location be such that the drainage is away from the healthy animals. Affected animals should not be allowed access to streams, as the infection may be carried by the water.

Some diseases are carried from sick to healthy animals by means of flies or other insects. When sick animals are confined in buildings it is possible to protect them from insects, so that this source of danger is eliminated. Should other cases of the disease occur among animals that have been removed from the sick, the healthy animals should again be separated from the sick and removed to other non-infected quarters.

When animals have been quarantined, a separate attendant should be secured to care for the sick ones. If this is not possible, the attendant should care for the healthy animals first, and after caring for the sick should provide himself with a change of clothing. In handling contagious diseases, precautions should always be taken that the attendant does not himself become infected; for some diseases, among them glanders, anthrax, probably tuberculosis and some parasitic diseases, may be communicated from animals to man.

CHAPTER III

THE CARE OF PETS

THE care of pet animals must depend very largely on the species of animal, and on the location as to whether in the city or country. In the country pets are very much more easily cared for and much less liable to disease and injury, on account of the freedom, variety of food, exercise and free surroundings. In choosing pets, it is good policy to select pure-bred animals of excellent individuality, as it costs no more to keep a good individual than a poor one, and the increased satisfaction that results is ample compensation. In choosing pets two points should be taken into consideration: (1) Docility, as it is much easier to care for quiet animals than for uneasy and nervous ones; (2) as a rule, medium-sized, short-haired animals are most easily cared for. In some cases, as in Angora cats, the long hair is a leading attraction; and these instances, therefore, are exceptions to the rule. If possible, one should select pets that can be kept for use as well as for pleasure.

In those animals in which the beauty and interest lie largely in the coat, extra care and precaution must be taken to keep it in prime condition. Light-colored animals require more attention than dark ones.

In caring for pets it is important that the natural

tastes of the animal be taken into consideration; consider whether it is herbivorous, living largely upon grass and grain, or carnivorous, subsisting chiefly on meat and other animal foods. Yet domesticated animals are usually not exclusively restricted to one diet, but will eat a variety of both animal and vegetable foods. Such variety, if palatable, is important in maintaining health and vigor.

A food that is suited to nearly all pets, since it furnishes all the necessary elements for their growth, is milk. It should be fed while sweet and preferably while it is warm from the cow. Warm milk seems to possess unknown health-giving qualities that disappear after it has been kept a half day or more. In feeding milk to pets, care should be taken not to allow them to have too much at a time. One of the greatest dangers to pet animals is overfeeding. They should be allowed small quantities frequently in order to keep them in a thrifty, vigorous condition.

DOGS

Among animals that are kept for pets as well as for use, the dog undoubtedly holds the first place. Upon farms where stock is kept, a well-broken collie dog is an unfailing source of help and satisfaction, while an unbroken dog is a continual nuisance. In handling stock with a dog, it is important that the dog be well trained, and that great care be exercised while the animals are getting used to being managed by him. When these two conditions are fulfilled it is

surprising how easily and economically stock can be taken care of.

Dogs are usually selected on account of their beauty, size, markings, intelligence, or some individuality that may appeal to the fancy of the chooser. In deciding this matter the question of male or female is often important. If intended for a house dog, bitches are frequently preferred, as they are generally more tidy in habits and often more easily trained than male dogs. The disadvantage, provided one does not wish to breed them, is the period of heat which occurs about once in six months, beginning usually when the bitch is about one year old. During this period there is a tendency for the bitch to leave home and for other dogs to gather and remain about the premises. When bitches are kept without spaying, and it is not desired to breed them, during the period of heat they should be completely isolated at a considerable distance from other dogs, preferably in such a place as a barn loft or cellar, where the dogs will not be attracted. They should be kept isolated for at least ten days, or during the whole period of heat. If the bitch is not to be kept for breeding purposes it is usually best to have her spayed, preferably before she has come in heat at all. Spayed bitches make excellent house dogs, the only objection to them being that they take on fat readily. In some communities unspayed bitches are taxed heavily in comparison with male dogs, but a certificate showing that the bitch has been spayed usually brings them under the same tax rates as other dogs.

If one wishes a dog to break or train for a special purpose, a young animal should be chosen. There is, of course, an increased danger of loss from death, especially if the puppy has not yet had dog distemper; but it is a great advantage to get acquainted with the puppy, and to begin to break him while he is still tractable. Puppies, as a rule, are weaned at four to six weeks old. After weaning they should be fed fresh milk diluted one-third with boiled water. In this milk dry crusts or a small amount of dog-cake may be soaked. A piece of bread or dog-cake may also be given dry for them to gnaw on, but it should not be supplied in small pieces that they can swallow whole. Long-haired puppies and kittens get the hair about the mouth dirty and matted with the food they eat. The parts should be carefully washed, else the skin may become sore. If possible to avoid it, puppies should not be washed all over until they are half grown.

When it is necessary to wash puppies or kittens, use warm water and apply it with a sponge or soft rag. Avoid immersing the animal in a cold bath, as it is likely to cause a nervous shock. After long-haired puppies are six to eight months old, they may be washed, using soft, warm water and a mild soap. Some of the tar soaps are excellent, as they have a soothing action on the skin, and have a tendency to free the dog of vermin. After washing, the soap can be rinsed out and the hair dried by rubbing with cloths or by allowing the animal to roll in clean straw in a sunny place.

It is important that puppies and their quarters be

kept clean, in order to avoid injury from parasites. Young dogs should be kept in roomy quarters where they have access to a sunny yard, and a dry place in which to sleep. It is best to keep but a few together in one yard. Puppies are active animals and need much exercise. It is a good plan to take them outside their quarters once or twice daily for exercise, but they should not be taken very far, especially when young. Dogs that are closely confined are likely to lack vigor and suffer from indigestion, diseases of the joints, and the like. Dogs that run wild are more difficult to break and handle.

When puppies get to be two months old a little meat may be given. It should not be supplied in large pieces, for they are likely to swallow it without proper mastication. Large bones compel the dog to gnaw the meat off and are much better. When several puppies are fed together, care should be exercised that the stronger ones do not get more than their share. Again, in feeding puppies in company with old dogs, see that the puppies secure their share of the food, and that they are not bitten or injured by older ones. It is much better to feed each animal by itself, so that it will not be disturbed by others.

When only a few dogs are kept, scraps from the table furnish a variety of excellent food, especially when a small amount of meat-gravy or drippings is added. When there are many dogs, well-baked corn-bread that has been slightly salted is an excellent and economical addition to the diet. Dogs always should be allowed all the clean water they want to drink.

THE BREAKING OF DOGS FOR FARM PURPOSES

The essentials to a good trainer of dogs are: (1) An interest in the animal; (2) a knowledge of what is required; (3) good judgment and patience. It is an excellent plan to have an older and well-broken dog to assist in the training, as dogs are imitative. The puppy quickly learns what is wanted by association with the older dog. In breaking dogs to handle stock, it is also a great advantage to have stock that is used to being driven by a dog, upon which to break the puppy. Stock that is not used to a dog is often easily frightened, or it may fight the dog. If a puppy is hurt or gets into a notion of chasing stock, bad habits may be formed that are difficult to overcome.

The first essential in breaking a dog for any purpose is to teach him to mind. Dogs are intelligent and affectionate animals, and are usually gratified to do the will of the master. If possible, an animal should be broken to mind without fear of punishment. When a dog obeys and does the required task, he should be rewarded by a word, caress or bit of something to eat. When it is necessary to punish a dog for disobedience, the trainer should be sure that the animal understands what is wanted, and if he refuses to do the task he should be punished judiciously — the punishment depending largely on the nature and disposition of the dog. Dogs of a sensitive organization must be punished cautiously; it is usually a good plan to shut the dog up alone after punishment and allow him to think it over. A mistake that is commonly made by novices

in training dogs or other animals is to attempt to teach too much at once. A dog should be trained to do one thing, and do it well, before another lesson is attempted. Dogs that are confined either by chains or in yards are easier to break than those that run at large.

When a dog has a tendency to run away and chase stock or game a strong cord attached to the collar is of great help in controlling him. If the dog is headstrong, a collar with spikes on the inside, just long enough to prick him sharply, can be used. The dog should be spoken to sharply and firmly, and if he does not mind a slight jerk on the collar will serve to remind him. All faults and weaknesses in young dogs should be watched for and corrected as soon as possible, as they are likely to grow rapidly and to become firmly fixed habits as the animal gets older. This is especially true of a tendency to be cross to other animals or to people. It is difficult to break an old dog of this vice. It is an adage that you cannot teach an old dog new tricks.

In breaking dogs avoid shouting, as it is as easy to teach them to mind a single word or whistle, and much more satisfactory. One of the surest ways to spoil a dog is to club him or punish him severely for some error which he may not understand and then allow him to go free.

CATS

Cats hold a prominent place as pets on account of their cleanly, domestic natures, and their useful-

ness in keeping premises free from rats and mice. The chief objection to them is that they do not always distinguish between animals that are to be protected and those that are to be destroyed. They often prey upon the birds about the premises and even on young chickens.

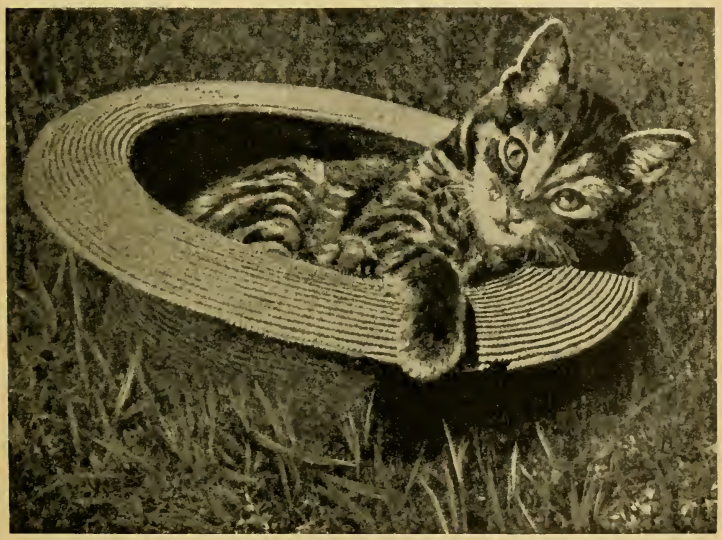

Fig. 12. The household pet

In country places cats require no special care or attention except such as may be given to fancy individuals. Milk and table scraps, supplemented by what they gather in foraging, furnish a good variety of food. In cities, where it is necessary to confine them, the problem is more difficult. If possible the

quarters for cats should be warm, sunny and dry. A bed of clean straw is better than a pillow, because easily renewed, as it should be from time to time. A pan with dry earth or sawdust should be kept where the cat may have access to it. This should be changed frequently, as cats are cleanly animals. In feeding young cats, care must be exercised that they do not eat too much, as indigestion induced by this cause may bring on convulsions or "fits."

When a kitten has a convulsion it should be wrapped in warm cloths and placed in quiet quarters; after it recovers a half teaspoonful of mustard mixed with a little tepid water may be given to induce vomiting and thus to empty the stomach. This may be followed with one-half to one teaspoonful of castor oil administered with a little warm milk to purge the bowels. Usually cats that can run out of doors will eat grass or other green leaves that tend to correct digestive troubles. When cats are confined, bits of celery may be given in the place of grass and leaves.

Caring for the coats of pet animals is important. Cats and dogs can be washed frequently with some mild soap and warm soft water; the soap should then be rinsed from the skin and the hair should be laid in the proper direction before it dries; after the body is dry the coat can be gone over with a soft brush. Brushing the coat is much better than combing it. Some cats can become accustomed to washing with water, but most of them resent it. A little

sweet cream rubbed on the coat induces the average cat to lick the hair down smoothly.

The following advice on the care of cats, by C. H. Jones, editor of "The Cat Journal," is reprinted, by permission from "Country Life in America" for November, 1902:

"There are two mistaken opinions regarding cats; one, that the cat is a hardy animal; the other, that a cat, no matter how or where abandoned, is able to provide for itself.

"First, a cat is not a hardy animal; her organization is delicate, her nervous system sensitive. Second, a cat cannot always provide for herself, even in her natural state and with all her native instincts unimpaired. Even man, when unaided, often fails here. In hard winters the Indian starves in his wigwam, and the wild-cat starves in the woods. Much less, then, is a cat that is accustomed to the comforts of a home and the surroundings of civilized life able to take care of herself. Of all the cats abandoned each year when the summer cottages are closed, the greater part lose their 'nine lives' and are 'gathered to their fathers' long before the winter is half over.

"People who pay high prices for Persians and Angoras are willing to take pains to keep them in health and life, and they try to give them proper attention; but while care is needed, it is easy to give them too much if knowledge is lacking on the part of owners. The pet is fed with wrong foods at wrong times, and if a little indisposition manifests itself it is usually faithfully drugged and killed off in the best of style.

"The common causes of death among cats are teething, worms and overfeeding, especially the last. Cats should be fed only at regular intervals, like individuals who wish to keep well; adult cats twice a day; kittens not over four times. If there are but few cats in the house, feed them from the assortment left from the table, including a liberal proportion of vegetables and cereals. Beef and mutton are good; also white-meated fish cooked and boned, raw cream, fresh or scalded milk. A little lack of appetite should cause no alarm. Remember that more cats die from overeating than from starvation. It is better to err on the side of underfeeding.

"Soft foods, like oatmeal, must be thoroughly well cooked. Rolled oat preparations should cook at least six hours. Dry package foods are better. In case of bowel looseness, no solid foods should be given; the animal should be fed for a time on scalded milk, which may be strengthened by adding arrowroot, rice or oatmeal water, or any of the patented baby foods. Liver is an intestinal irritant, lacking nutriment; it should be given only cooked, and occasionally as a relish. Most cats are fond of a food made of one part finely chopped beef or mutton, two parts stale whole wheat or graham bread softened with water; add an egg or two, and bake till thoroughly cooked but not crisped. This is a wholesome and an excellent preparation. It is a good food to use in shipping. Sprinkle a little pinch of sulfur on the soft-boiled or poached egg that you give them twice a week, or if they are not partial to egg it may be sprinkled

on the other food. As sulfur is practically tasteless, they will not object to its use in this manner.

"A common cause of sickness, especially in long-haired cats, is clogging of the stomach and intestines with hair in the shedding season. The cat should be brushed daily with a soft bristle brush, removing by this gentle process as much of the hair as possible. This will not prevent the cat from licking itself and swallowing hair; but it will prevent it, to a certain extent, from becoming dangerously injured by it. During the 'molting season,' give daily with her food a dessert-spoonful of fresh olive oil; if she objects to this, mix it with a little juice from a can of salmon. The oil will assist her in disposing of the hair in a natural manner. If the cat throws up casts of hair, congratulate her, as it is one of nature's ways of affording relief.

"Cats should be kept free from matted clots of hair, for vermin deposit their eggs in these. A comb will disentangle them if used in time, but if they do not easily yield, work them full of vaseline, and leave over night; this loosens them so that a comb should remove them; but if they still resist, remove them with scissors, taking care not to hurt the skin. This matted hair is usually dead hair and should come out.

"Washing cats is not a good practice. In case of sickness, for sanitary purposes, dry boracic acid, dusted into the hair and brushed out, will accomplish the result desired with less annoyance to the animal. If the cat needs cleaning, fill the fur with damp, warm bran and brush it.

"At the first sign of dryness of the ear, fill with dry boracic acid and leave in the ear. This applied daily for a week will usually bring about natural and healthful conditions. If the kitten scratches her ear, crying at the same time, examine the ear; if it is coated or partially filled with a dry, scaly, bloody substance, a few drops of peroxide of hydrogen mixed with an equal quantity of water, dropped into the ear, will cause a foam to appear. Wipe this off with a soft dry cloth, then dust in dry boracic acid. A few such treatments will usually effect a cure. The malady, if neglected, almost always ends in an abscess.

"In general, one should not be in too much haste to doctor a cat. If there is no certainty as to what her trouble is, and no specialist on cat diseases accessible, it is better simply to keep her warm and feed her on light diet, and leave nature to effect a cure. This is far preferable to filling her system with a lot of drugs that are perhaps not indicated by the symptoms. Remedies recommended for dogs are generally fatal to cats, and must be used with great caution and given only by a specialist. Anything containing carbolic acid is almost certain death to a cat. A sick cat wants quiet; so do not torment her by fussing over her all the time, for by this mistaken kindness you may kill the animal.

"If a kitten has a fit, which is usually caused by teething, worms, too much or too strong food, submerge her at once to the neck in warm water, with cold water on her head; leave for five or ten minutes, then dry with a soft cloth, old newspapers, or tissue

paper, and lay in a dark place, cover warmly and let alone. If you notice the spasm coming on, place cold water on her head immediately and it will usually prevent the trouble. There is no danger of being bitten by a kitten in a fit.

"A powdery substance through the fur indicates fleas. Saturate with olive oil. This brings the vermin to the surface, where they may be easily killed. If it is a nursing kitten, wash, after using the oil, with white castile, or some mild antiseptic soap and thoroughly dry; otherwise the mother may desert her. If she is not nursing, leave the oil on for a few days. It does not make her look pretty, but she will not mind this and you need not, as it gives her perfect rest from the fleas. Never believe that a flea is dead until you hear it crack or see it in the hot water. Fleas quickly reduce the vitality of a cat; she will die if they are not removed. Cat-fleas will not get on human beings. Cat-fleas are different from dog-fleas."

RABBITS AND HARES

Rabbits and hares (Fig. 13) are popular pets and are also used extensively as food. They are easily handled and kept. While naturally herbivorous, they will eat a great variety of food. Pens for rabbits should be constructed in dry, sunny situations, and should have good drainage. The walls of the pens should be strongly constructed, so that they will not only prevent the escape of the rabbits, but also protect them against the attacks of dogs from the outside. To keep

the rabbits from burrowing out, the walls must be carried down deep into the earth, or else the floor of the yards must be paved or covered with chicken-wire.

Fig. 13. Belgian hares

Rabbits are fond of burrowing, and it is therefore generally considered beneficial to have the floors of dry earth. If the pens are kept well littered with straw or similar material, the animals seldom dig much, but if they once get access to the earth they will burrow rapidly.

A yard sixteen by twenty feet will accommodate twenty rabbits, or even more. A part of the yard should be covered in some way to afford shade. In connection with the yard, a house five by eight feet should be constructed; it should be well ventilated and lighted, with the window so arranged that it can be darkened. The entrance from the yard to the house should be through about two lengths of five-inch tile, one joint inclining downward from the yard and the second joint inclined upward into the house. Rabbits seem to enjoy running through a tunnel. It is useful in preventing the entrance of cats, as they will seldom crawl through a long tunnel of this character. Should dogs gain entrance to a yard they will usually dig at the end of the tile rather than attempt to dig under the wall. Straw can be used for litter in the house, but it should be removed frequently and burned.

During the winter months rabbits and Belgian hares can be fed clover or alfalfa hay, oats, apples, cabbages and other materials of this character. The pens should be cleaned frequently and disinfected with a five per cent solution of carbolic acid every month or six weeks to prevent infectious diseases and to destroy parasites.

In breeding rabbits, one buck is usually sufficient for twenty does. The buck and the does should be kept separate. When a doe is about to give birth to young, she should be separated from the others until the litter is two weeks old. When the bucks get to be two months old they should be castrated, or they will fight each other and will not fatten readily.

CAVIES OR GUINEA PIGS

The cavy or Guinea pig makes an admirable pet, and it may be used as food. It is a prolific breeder. It occurs in great variety of color and texture of fur. Cavies are easily kept and are free from the strong odor that characterizes rabbits. When it is necessary to keep the pet animals in a small yard or even in the house or barn, the Guinea pig is preferable to the rabbit. The food it requires is practically the same as for rabbits, with bread and milk and table scraps. Fresh water should be supplied often to rabbits and Guinea pigs, and the quarters always should be kept clean and dry.

When rabbits and Guinea pigs are kept in large numbers and the quarters are not well cared for, an infectious pneumonia or blood-poisoning often breaks out among them and destroys large numbers. In case such a disease appears, the uninfected animals should be removed to a clean, dry place. The old quarters should be thoroughly cleaned, then disinfected with a 5 per cent solution of carbolic acid, and after being thoroughly dried should be whitewashed or painted before other animals are placed in them.

PET POULTRY

Most children are fond of pet animals. The pets are not only a source of much enjoyment but are of real educational value. Pet animals instil a love for nature and a respect for the feelings and rights of other

beings. The necessary feeding, handling and care develop the feeling of responsibility that is of great importance in the training of children. The essential requirements in children's pets are that they should be docile, attractive, cleanly and easily cared for. They

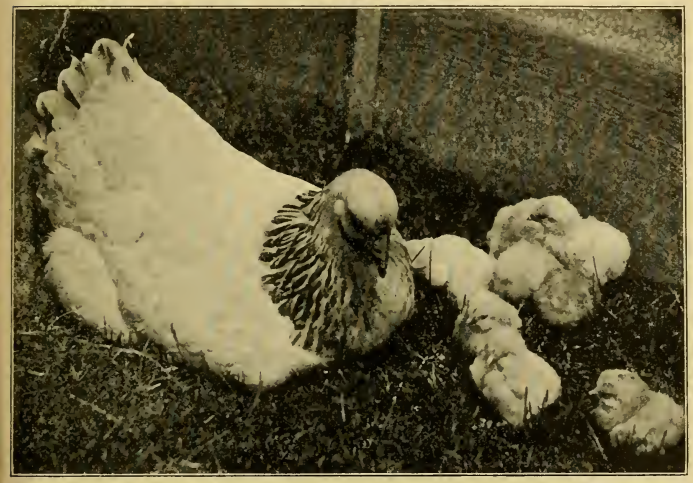

Fig. 14. Brahma and chicks

should not be very delicate, else they cannot be easily raised with a moderate amount of attention. Pets should also be such as are adapted to the surroundings. Pet poultry, as a rule, meets the requirements more fully than other animals.

Chickens and some other poultry can be kept in small numbers almost anywhere, if a small plot of ground is available, or even in a barn. The food is readily procured, the birds are easily cared for, and returns

come quickly. Of the various breeds of poultry that combine beauty with economic value, the Gold or Silver Spangled Hamburgs can scarcely be excelled. The Bantams are very attractive to children, but their general utility is impaired by their small size.

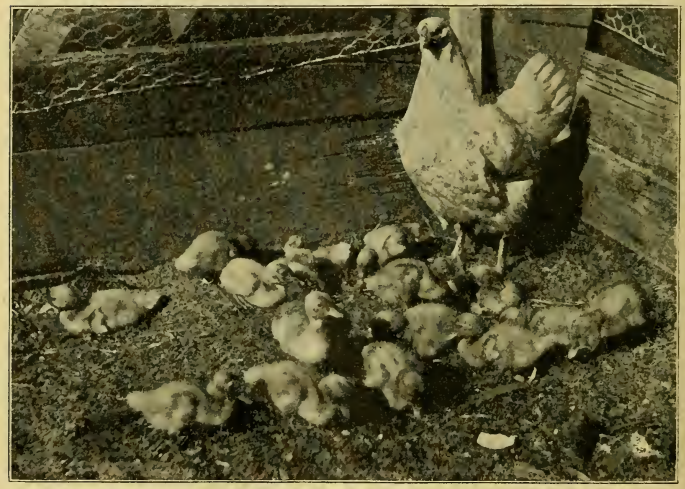

Fig. 15. Ducks with a hen mother

Children should be consulted in the arrangement of quarters; and the devising of locations for the nests can be left largely to them. It is a source of delight to arrange nests or to find those that the hens have located, and the gathering, caring for and disposal of the eggs is an interesting and important training. The selection of eggs for hatching, the setting of the hen and her care during the sitting period, the evidence of

the young chicks in the shell, "pipping" of the egg, the bursting of the shell and appearance of the active fluffy little chicks are constant sources of wonder and expectation. The care of the mother-hen and her brood is perhaps the most interesting to children. The motherly solicitude of the hen for her chicks and the care and protection she gives her brood appeal to childish sympathies.

When it is desirable to make pets of chickens so that they can be readily handled, young chicks should be selected and the child be allowed to train them by careful handling. Chickens are easily taught simple lessons. To do this a little attractive food is the best means of training them to respond to simple demands. Care is required in handling chickens in order to avoid hurting them, as pain soon makes them timid. The proper method of handling is to catch the chicken either by the legs or between the outspread hands. The chicken can be carried by tucking it under the right arm, in the upright position with the head forward. Avoid injuring the chicken by carrying with the head downward or holding by the wings.

Chickens are so easily and quickly reared that the children may easily be set to experimenting with different kinds. For efficiency, however, one kind is preferable to many. See that the quarters are light, warm and airy, and do not confine the food to grain alone.

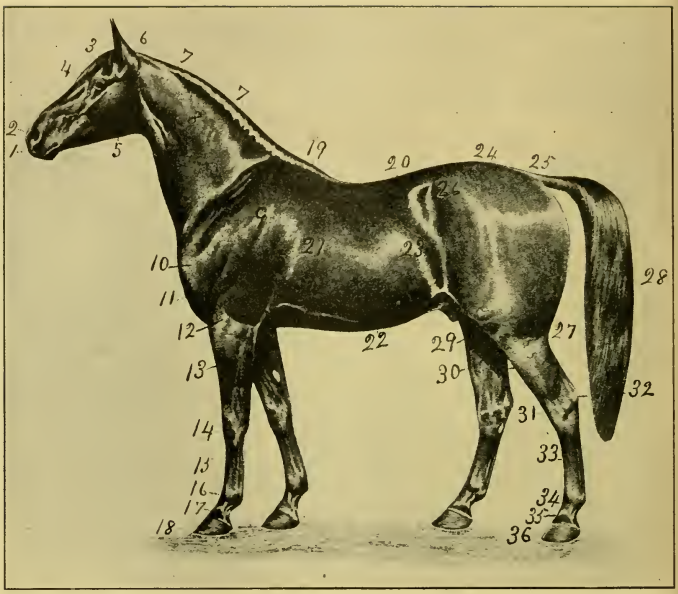

Fig. 16. The Parts of a Horse

1. Muzzle
2. Nostril
3. Forehead
4. Face
5. Cheek
6. Poll
7. Crest
8. Neck
9. Shoulder
10. Point of shoulder
11. Breast
12. Elbow
13. Fore-arm
14. Knee
15. Cannon bone
16. Fetlock
17. Pastern
18. Hoof
19. Withers
20. Back
21. Ribs—side of chest
22. Belly
23. Flank
24. Croup
25. Dock
26. Point
27. Haunch
28. Tail
29. Stifle
30. Gaskin
31. Hock
32. Point of hock
33. Cannon bone
34. Fetlock
35. Pastern
36. Hoof

CHAPTER IV

THE HORSE—JUDGING AND HANDLING

THE ability to judge horses and to determine their relative values for definite purposes is usually acquired only by experience. There is no short-cut way of determing the merits or soundness of a horse. The horseman must familiarize himself thoroughly with the animal; and the better he likes a horse the better judge he will be. Some points which are recognized as important by good judges are mentioned below. These points are, of course, not infallible, but they may be suggestive to the novice.

AGE

The age of a horse determines, in a general way, the limit of its usefulness. Still, it is not always a sure guide to follow. A well-preserved horse, of good disposition and nervous temperament, is often younger at sixteen, as far as activity and usefulness go, than many another horse is at eight. But the average horse has reached the limit of his usefulness at twenty years of age. Exceptional cases may not have entirely outlived their usefulness at thirty, and instances are recorded of horses having lived for more than fifty years.

A horse's age is commonly determined by an examination of the individual teeth. This is usually an ac-

curate method until the tenth or twelfth year. After this period the general appearance of the teeth and the bones of the head are relied upon in determining age. In colts, the bones of the face and lower jaw have a full, rounded appearance, because the roots of the teeth extend far into the bone. The face gradually becomes more concave on the sides, the lower jaw thinner from side to side, and the lower edge much sharper. The hollows above the horse's eyes become deeper, and the bones more prominent, due to the absorption of fat from this region. Unscrupulous horse-jockeys sometimes make a small incision through the skin and fill up this depression by blowing it full of air. This practice is commonly called "puffing the glims." It is a deception that is easily recognized. As horses get older there is a tendency for the hair to turn gray in the region of the muzzle and the eyes, and there is a general appearance of advancing age that is difficult to describe.

THE TEETH OF THE HORSE

In the mature horse's mouth, the teeth which are used for biting the food are twelve in number, six in each jaw. They are situated just within the lips, and are called the *incisors*. The *molars*, or *grinders*, are the large double teeth, whose function it is to masticate, or grind, the food. There are twenty-four of these, six in each half of both upper and lower jaws. In males, there is an extra tooth called the canine, or "bridle" tooth on each half jaw, in the space between the incisors and the molars. These are sometimes found

in mares, but are usually small and not well developed. In a complete set of teeth, the mare has thirty-six, and the horse forty. Small, extra molars are sometimes found in front of the first molars on the upper jaw, (rarely on the lower), commonly called "wolf teeth."

The molar teeth are distinguished by numbering them from before backwards, and by using the terms right and left,—as, the third right upper molar. The incisor teeth are named according to their position: the two teeth occupying the middle are called the *central incisors*; one on either side of these is called a *lateral incisor;* the two outer ones, one on either side, are called the *corner incisors.*

A horse has two sets of teeth. The temporary, or "milk" set, twenty-four in number, consists of twelve incisors and twelve molars. There are three incisors and three molars in each half of each jaw. These differ from the permanent set described above by being smaller, whiter, and having a well-defined constriction, or neck, at the gum.

The temporary teeth in colts are erupted, or "cut," as follows: At birth a colt has three temporary molars on each jaw and the two central incisors or "nippers." They may be covered by thin skin, which breaks within a day or two. The lateral incisors on both jaws are erupted at four to six weeks, and the corner incisors at six to ten months. Thus, at one year old the colt has a full set of twenty-four temporary teeth.

The temporary incisors are replaced by permanent teeth, as follows: The two central incisors are shed at about two and a half years, and the permanent ones

are up "in wear" at three years. The lateral incisors are shed at three and a half years and the permanent ones are up and in wear at four years. The corner incisors are shed at four and a half and the permanent ones are up and in wear at five. (Fig. 17).

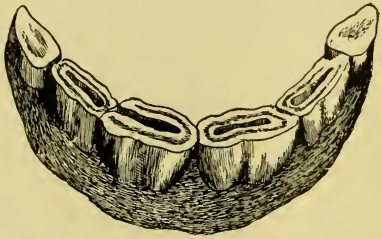

Fig. 17. Horse's teeth at four years of age

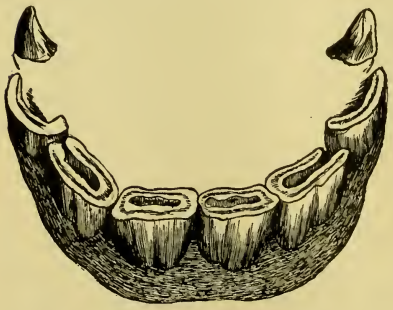

Fig. 18. Horse's teeth at five years of age

The molars are erupted and replaced as follows: The fourth molar on each jaw (which is always a permanent molar) is erupted at ten to twelve months; the fifth permanent molar, at two to two and a half years, and the sixth usually at four and a half to five. The first and second molars, which are temporary, are shed and replaced by permanent ones at two to two and a half years of age. The third temporary molar is replaced by a permanent one at about the age of three and a half years. In males, the canine or "bridle" teeth are erupted at about four and a half years of age. A five-year-old colt has a "full mouth" of permanent teeth (Fig. 18), and at this age

a colt becomes a horse and a filly becomes a mare. The temporary teeth are usually shed easily; the permanent teeth pushing up from below cause the roots of the temporary ones to be absorbed, until they finally become mere "caps," attached to the gum. Sometimes the temporary corner incisors are extracted in order to make a colt or a filly appear older than it is. Such a practice is not to be commended.

Fig. 19. Horse's teeth at six years of age

When the permanent incisors are first erupted, well-defined "date-cavities" exist in their upper surfaces. These cavities, dark brown or black in color, narrow from before back and wide from side to side, extend quite a depth into the tooth. Each date-cavity is surrounded by a very narrow band of enamel, which can be distinguished from the yellower dentine that composes most of the substance of the tooth. The date-cavities wear out and disappear from the lower incisors at the following ages: From the lower central incisors

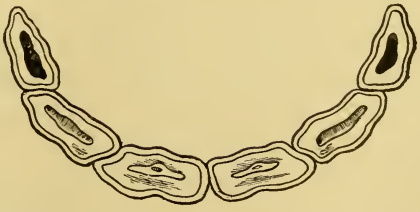

Fig. 20. Horse's teeth at seven years of age

the cavity has largely disappeared at six years (Fig. 19), the lateral at seven years (Fig. 20) and the corners at eight years of age (Fig. 21). The date-cavities in the incisors of the upper jaw do not disappear as regularly as the lower, and are less to be depended upon. In general, the date-cavities disappear from the central upper incisors from nine to nine and a half years; from the lateral upper incisors from ten to ten and a half; and from the upper corner incisors from eleven to twelve years. Date-cavities sometimes persist in the upper incisors for a longer period, especially in horses that are stall-fed. In examining date-cavities, a careful comparison with the preceding and succeeding years should always be made. After a date-cavity is worn out, a small black spot called a "dental star" remains, and frequently a small cavity, which should not be mistaken for a date-cavity.

Fig. 21. Horse's teeth at eight years of age

Fig. 22. Horse's teeth at ten years of age

In young horses, the incisor teeth are broad from side to side, and approach the perpendicular with reference to the jaw. As the horse gets older, the incisors wear down, becoming narrower from side to side and wider from before back, so that the upper surface of

the tooth presents a triangular outline. The incisor teeth also tend to become more horizontal, causing the profile of the incisors to become "chisel-shaped." As horses get older, the teeth grow up and out of the jaw-bone, until in aged horses the molar teeth may become old "snags," so loosely attached to the jaw that they may be moved with the fingers or may drop out. A deception that was formerly practiced, but is seldom met with at the present, was commonly called "bishoping." This consisted in cutting artificial date-cavities in the incisors, and blackening them with a hot iron. The shape of the tooth, and the absence of the ring of enamel should render deception by such a practice impossible.

Fig. 23. Horse's teeth at sixteen years of age

In order to be able to determine the age of horses, a careful comparative study should be made of the teeth of animals whose ages are definitely known.

CONTRASTS WITH CATTLE

In cattle, there are eight incisor teeth on the lower jaw, and none on the upper. The two central incisors are named as in the horse; the next two, one on either side of the central incisors, are called *internal laterals;* the next two, one on either side of these, are called the *external laterals;* the remaining two are called the *corners.*

The temporary incisors in cattle are erupted, or cut, as follows: The central incisors or nippers are up at birth, the internal lateral at one week old, the external lateral at two weeks, and the corner incisors at three weeks old. They are replaced by permanent incisors approximately as follows, though they vary much more than in the colt: The central incisors are replaced at twelve to eighteen months; the internal laterals at about two and a half years; the external laterals at three to three and a half years; and the corner incisors at about three and a half years.

In horned cattle, a ring of the horn makes its appearance at three years of age, and a new ring is added annually thereafter.

COLOR OF HORSES

In selecting horses, the color is largely a matter of personal preference; but, other things being equal, horses of decided dark color are preferable. A blood bay, mahogany brown, dark chestnut and black are usually given preference in the order named. The objection to white or light-colored horses is the difficulty in keeping them clean, the looks of light hair upon dark clothing when the animals are shedding their coats, and the fact that such animals are subject to melanotic tumors of the skin. Horses having white noses and muzzles are liable to inflammation of the skin in this region when turned out to pasture. A color that will not bleach when exposed to the sun or weather is desirable.

A matched team is made up of horses of the same

size, color, action, temperament and general appearance. A "cross matched" team is one that is well matched except as to color, the two horses being of contrasting or complementary colors, which render each other more vivid when placed together; such as white and black, or chestnut and white.

STYLE

Another desirable quality to look for in judging a horse, and one which adds greatly to its value, is the "action" and style of the animal. A horse that looks, acts and walks as if he "owned the earth" will bring a great deal more money upon the market than a similar horse with all the good qualities but this one. Action does not mean speed, but implies quick, dainty, stylish movements. The purpose for which a horse is intended should always be kept prominently in mind in passing judgment upon it. The above statements may not apply to draft horses.

POINTS IN HORSES

The following are some of the points that are considered to be desirable in horses:

The head should be of moderate size, and well hung on the neck, the angle between the lower jaw and the neck approaching a right angle. If it is more than a right angle, the nose protrudes as if the horse has a sore throat or poll-evil; if less than a right angle, it gives a cramped appearance to the neck. The forehead should

be broad, the nose straight, the sides of the face slightly dished, the cranial bones well rounded, and the eye full, bright and prominent. Horses with small "bullet" eyes look better when driven with blinders on. If the nose is too concave, the horse is said to be "dish-faced," and if too convex, a Roman nose results. The nostrils should be large and easily dilated, the lips firm and fine, and the cheek well muscled. The ears should be of moderate size, fine, tapering and mobile, approaching each other at the tips when erect. If the ears are too small they have a stubby look; if too large, they are mulish in appearance. A lop-eared horse is liable to have a contrary, morose disposition, or worse. The expression of the eye, ear and countenance gives prominent indications of the character and disposition of the animal. The neck should be of medium size and length, the skin fine, and the muscles of the neck should have a firm, "cordy" feel to the hand. A neck slightly arched at the crest is usually desired; a thick, coarse one is commonly called a "bull neck"; if too long and slender, or too greatly arched, a "peacock" neck; and if concave on upper outline, a "ewe" neck. The back should be moderately straight, short, and well muscled; such a horse is said to be "well coupled." If the back is too straight or convex, the animal is said to have a "roach" back, and if too concave a "sway" back. The croup should be slightly rounded and sloping, the tail should be well hung and carried in a dainty manner. Horsemen usually prefer that the tail or "dock" should be held stiffly by the animal when an attempt is made to lift it with the hand, as this is thought to indicate stamina.

Horses intended for speed should stand high behind. The withers should be firm and moderately thin, the shoulders should be well muscled and preferably sloping. In horses intended for draft purposes, moderately sloping shoulders are preferable. The fore-arm should be well muscled, the muscles and tendons of the leg firm and prominent. The bones should be round and fine, the joints of good size and the leg moderately wide from before back. The skin should be fine and should lie close to the bones and sinews of the leg. The chest should be broad, deep and strongly muscled. The ribs should be "well sprung," that is, coming well out at right angles from the back-bone, thus giving the horse a good round barrel, which furnishes room for the lungs and digestive organs. A horse lacking in this capacity is said to be "slab-sided" and "washy," and usually lacks stamina. The horse should not be "tucked up" in the flanks, and the hips should be strongly muscled, because it is here that most of the power is required, either for speed or for draft purposes. The legs should be well placed and the bones well directed, making the proper angles at the various joints. A horse intended for draft purposes should be "built close to the ground." In all horses, the coat should be fine and short, the skin thin and soft to the touch, showing the large veins clearly. In all horses, except Clydesdale and Shires, the legs should be comparatively free from long coarse hair. The mane and tail should be of moderate length and thickness, fine and silky, the tail being especially important, because of the character and style which it gives to the general appearance of the animal.

UNSOUNDNESS IN HORSES

A horse is considered practically sound when it possesses no disease, deformity or vice that will interfere with its general or special usefulness. Soundness is important, not only to those who deal in horses, but to those who raise and own them, because its soundness, together with the general appearance of the animal, indicates its relative commercial value. A person who contemplates purchasing a horse, if he is not thoroughly familiar with the subject, will usually find it a matter of economy to employ an expert to assist in the selection, or he will purchase of some well-known dealer whose judgment and whose "word" are worthy of dependence. The ordinary individual is likely to pride himself upon his ability to judge horses and to determine their soundness or unsoundness; and yet there is probably no one experience in which individuals are more likely to be deceived than in this. Horse-dealers of wide experience usually make allowances in their judgment of a horse for defects which cannot be determined by an ordinary examination, but are likely to show themselves only after a thorough acquaintance with the animal. As a general thing, the purchaser sees a horse at its very best, as regards appearance, condition, speed and freedom from defects and vices, and should take this into account in estimating the value of the animal. In examining animals as to their soundness, experienced judges do not allow themselves to be misled, or their attention to be distracted from any part of the animal, either by the owner or by bystanders. An excellent

judge of horses once said, "If the owner or a bystander calls my attention to a possible defect about the horse's head, I always make it a point to give the opposite extremity a most thorough examination." It is a trick frequently resorted to by unscrupulous dealers to call a man's attention to a part he knows to be sound, in order to attract his attention from an unsoundness in another part. In considering statements made by horse-dealers, especial care should be given not only to the statement, but to the reasons why the statement is made.

When possible, it is always a good plan to examine horses in the stable under their ordinary conditions, then to take them out where the light and other conditions are favorable and go over thoroughly every part of the horse until one is satisfied of its freedom from unsoundness. After thoroughly manipulating every part, the horse should be tested in his paces for any defect in locomotion or breathing, and afterwards he should be tested as to his ability to eat and drink normally. In examining horses for soundness, it is generally assumed that the horse has every defect, deformity and vice that horse-flesh is heir to, and the presence or absence of these defects is demonstrated by thorough examinations and tests.

WARRANTY

A person that warrants a horse sound, either by a written or verbal warranty, renders himself liable, and the purchaser can recover damages sustained. Persons

in selling horses should exercise care in warranting a horse sound, either directly or by the use of language that implies a warranty; for if the purchaser takes the horse on the strength of such representations and the horse proves to be unsound, the seller is himself responsible. A distinction is usually made between those cases in which the purchaser buys the horse on the strength of the representations made by the owner, and those cases in which the purchaser assumes to know about the horse, and buys on his own judgment and responsibility. It is usually economy to purchase of a reliable person and, if possible, on a trial of a week or more. Whether justly or not, it has come to be proverbial that the horse trader is "tricky."

EXAMINATION OF HORSE IN STABLE

In examining the horse in the stable, do not disturb him at first, but watch him closely for a few moments; he will be likely soon to show any stable vices that he may possess. Among vices to be looked for is "weaving," a habit which some horses have of swinging the head or body from side to side, often for an hour at a time, especially when not eating. Cribbing and wind-sucking are other vices which should be carefully looked for. Kicking in the stall, and crowding an attendant against the side of the stall are vices. Some horses have the bad habit of kicking at the side of the stall. Persistent pawing is also to be looked for. The horse should be made to "stand over" by gentle pressure against the hip, when he will frequently show signs of

chorea, or stringhalt. A common symptom of this disease is the apparent inability of the horse to lift the foot of the affected hind leg,—the foot is seemingly glued fast to the floor. After a considerable effort, the horse gets the foot loose, lifts it high and moves over with a kind of straddling hop. These symptoms are not shown when the horse is made to jump suddenly by the cut of a whip or slap of the hand; therefore such actions about a horse should be looked upon with suspicion. It should also be noticed whether the horse stands squarely on his feet, or "points" a foot to get relief from lameness or soreness in the part. Halter-pulling is another vice which it is difficult to detect. A sudden movement about the horse's head, which startles him, will usually cause him to fly back on the halter, if he possesses this vice. Horses that are very strongly tied by ropes or similar arrangements about the head should be regarded with suspicion.

EXAMINING OUT OF DOORS

After the horse has been examined in the stall, he should be led out on level ground where the light is good, and every part of the body should be examined for defects and disease. It is usually a good plan to begin at one nostril and to go over the whole side of the animal; then, returning to the opposite nostril, to examine the other side. The nostril should be examined for any sign of glanders, or other suspicious discharges. The mucous membranes lining the nostril should be of a healthy rose-pink color, free from ulcers, scars or dis-

agreeable odor. Any signs of a recent cleaning of the nostril, a dull lead color, or irritated condition of the mucous membrane should be regarded with suspicion. The mouth should be examined as to age and freedom from decayed, split, ulcerated or irregular teeth. The saliva should be free from any disagreeable odor. The tongue should be normal, held in position, and free from scars. A scarred tongue is indicative of the use of a harsh bit to control him, and is always to be carefully considered. The incisor teeth should be examined for parrot mouth and signs of cribbing, the latter being shown by the edges of the teeth being worn away, so that they do not come close together. The side of the face should be examined for running sores or enlargements that might come from diseased teeth. The lower jaw is to be examined for the same condition, and, in addition, for an opening or fistula of Steno's duct, which carries the saliva from the large gland below the ear and pours it into the mouth. This duct winds under the lower jaw at the front edge of the large muscle, and when opened discharges a clear, watery fluid, especially when the horse is eating. The glands in the hollow between the lower jaws should also be carefully examined as to their size, whether tender to the touch or grown fast to the adjoining tissues. Enlarged, adherent glands here are a symptom of glanders.

The eye should be clear and bright and free from specks, cloudiness or a well-defined white ring around the outside of the colored iris. By closing the eye with the hand and excluding the light for a moment, the pupil will be dilated to its utmost capacity; when the

hand is removed and the light strikes the eye, the pupil should rapidly contract to its normal size. This shows that the eye is sensitive to light. Small, irregular masses of dark coloring material, commonly called "soot balls," are usually seen at the edge of the pupil in a horse's eye, and are often regarded with suspicion by those not familiar with the appearance of the eye. They are normal, and of no importance. The eye should also be examined for any signs of inflammation or abnormal discharges from the inner corner. Persistent discharges from the eye usually scald the skin and cause the hair to be shed in this region.

The throat should be examined for any thickness or enlargement, especially of the glands which form a goiter. The top of the head and neck should be examined for poll-evil, for swellings of any kind, and to determine whether or not the horse will allow a bridle or halter to be put on readily. The mane should be thrown over and the side of the neck carefully examined for fistulæ or running sores, tumors or swellings of any kind. Brands should also be looked for here. The letters I. C. on the neck indicate that the animal has been inspected and condemned in service in the U. S. Army for unsoundness, vices, or inability to stand gun-fire.

After going over the neck, the withers should be examined for fistulæ, and the back for tumors, galls or "sitfasts." The shoulder, also, should be examined for tumors, galls, collar boils and sweeney, the last a wasting of the muscles on the outside of the shoulder-blade. The elbow should be examined for capped elbow, or shoe

boil. The knee should be examined for bony enlargements, wind-puffs and scars on the front. Scars in this region indicate that the horse is a stumbler. Look just below the knee on the inside for speedy cuts, scars or bunches, due to the hitting of the opposite foot. Splints should also be felt for, and looked for on the inside of the fore leg, and bony bunches on the outside. The front of the cannon bone should be smooth and free from bunches and scars. The back tendons should be smooth; if contracted, they give the knee a "sprung" appearance, as the horse stands squarely. Parallel marks or scars resulting from "firing" should be looked for. Above the fetlock the leg should be examined for wind-puffs on either side, just in front of the tendons. The fetlock and pastern joints should be examined for ring-bones, bunches or scars. Small puffy enlargements over the large nerves which pass down toward the back of the fetlock and along the edge of the tendons, below the fetlock, indicate the injection of cocaine, which is done to disguise lameness temporarily. Scars in these places on both sides of the leg indicate that the horse has been "nerved." Just at the top of the hoof, on either side, the lateral cartilages should be examined to see that they have not ossified, forming side bones.

The foot should be of good size and shape, free from rings of horny growth, the wall not concave. The heels should not be contracted. The wall should be carefully examined for sand-cracks, quarter-cracks and seedy-toe, the last a softening and degeneration of the wall at the toe of the foot. The bottom of the foot should be

examined for corns, the cleft in the frog for thrush, and the sole for bulging.

After finishing the fore leg, the examiner should go carefully over the horse's side and belly, looking for any tumors, sores, hernia or ruptures. In the male, the penis and sheath should be examined for tumors or disease. It should be noted whether the hair on the belly in front of the sheath is normal in appearance, as some horses do not protrude the penis in passing urine and the skin in front of the sheath is irritated so that the hair is shed. The scrotum in males should always be examined for tumors, and geldings must be scrutinized to be sure they are not ridglings. In examining the hind legs of a strange horse, it is always well to take precautions to prevent being kicked, by having an assistant hold up one fore foot.

The muscles of the hip should be examined for scars, the stifle joint for any enlargement or soreness that would indicate stifle. A thorough examination should be made of the hock joint, because of the number and importance of the defects that may occur in this region. The back of the hock joint should be examined for capped hock, curb and scars which may indicate that the animal is a kicker. Just in front of the point of the hock, look for thorough-pin. The hock joint proper is to be examined for spavin, both bone spavin and bog spavin, also for any enlargements or any irregularities of movement. Below the hock, look for wind-puffs, ring-bones, scratches and diseases of the foot. After completing the examination of one side, go over the opposite side with equal care.

After going over the whole horse, the examiner should carefully compare corresponding members, as to their symmetry and form. The two hips should be compared to see that one is not "knocked down" or "hipped," and that the muscles are equally developed. The tail should be carried squarely; it should be handled and a line or rope drawn under it to prove that the horse is not vicious in this regard. The nostrils, lips, eyes and ears should be compared, and any signs of paralysis or drooping of the parts noted.

After examining, manipulating and comparing the parts of the animal, he should be thoroughly tested in his paces. He should be driven, or led, with plenty of rope, to and from the examiner, and then moved by him at a good, free trot, when any signs of lameness or peculiarities of movement should be carefully looked for. Turning the horse sharply to the right or to the left, so as to bring the weight alternately on the right and the left legs, will usually increase the signs of lameness. The horse should also be tested as to his ability and willingness to back a load. In testing for the wind, the horse should be allowed a full drink of water, and then should be ridden or driven rapidly for some distance and brought to a sudden stop, close to the examiner, who will look for any abnormal sounds or movements in breathing. A "wind-broken" horse can be detected by the peculiar roaring or whistling made as the air is taken in. In heaves, there is usually difficult breathing, with a peculiar bellows-like motion of the flank. By pinching the animal's throat, the peculiar and characteristic grunting cough of heaves will be given. The

horse should also to be tested to determine whether he eats and drinks properly.

The ability to detect unsoundness can be largely increased by practice and close observation; and yet some diseases and vices cannot be detected by an ordinary examination, and it is only after a person becomes familiar with the animal that these will be observed. In giving certificates of soundness, the examiner should carefully describe the horse so that it can be recognized; and he should call attention to any peculiarities, scars or actions that are unusual. A certificate of soundness usually carries with it considerable responsibility, and some expert judges will not give such certificates unless they know either the horse or the circumstances under which the certificate is required. Certificates are usually worded, "So far as I am able to determine by careful examination, the above described animal is free from any disease, defect or vice that will interfere with its intended usefulness."

FITTING HORSES FOR MARKET

There are probably few circumstances in the care and handling of horses in which food and labor will give greater returns than when devoted to the fitting of horses for the market. Horses intended for the general market should always be in good flesh or moderately fat, because fat, like charity, covers a multitude of defects. A plump horse appeals to the average buyer. In fitting a horse for the market, he should be fed an abundance of easily digested, nutritious and laxative food. He

should be thoroughly groomed every day with plenty of brushing, as this gives a sleek and glossy coat that adds much to his general appearance and attractiveness. The mane and tail should be well brushed out, and if the skin at the roots of the hair is dirty, it should be well washed and a little bland oil or vaseline applied. The horse should be exercised briskly for a short time twice daily, enough to keep him in good active condition; he should be taught to drive freely and handily, as soon as hitched up, as he will then show to the best advantage to an intended purchaser.

All horses intended for the general market should be well "broken." There is a rather wide-spread opinion among farmers that as soon as a colt is broken well enough to drive single and double, it is sufficient for market purposes, but this is not true. The extra time spent in properly breaking and training the horse, will be well repaid in an increased price.

SHIPPING HORSES

Horses intended for shipment should be in moderate flesh and in good condition so far as exercise and general health is concerned. The tails should be carefully braided, done up and covered with burlaps to prevent their being injured in transit. For twenty-four hours previous to shipping, the animals should be fed lightly with laxative food to overcome the decided tendency toward constipation caused by the excitement and strain of shipping. As a general thing it is preferable to ship them barefooted, as, in this condition, there

is less danger of slipping and injury to themselves or to others. It is a good plan to rasp the edges of the hoofs to prevent their splitting and breaking off. The car should be thoroughly disinfected and the floor should be well covered with fine litter or similar material, to absorb moisture and so to prevent it from getting wet and slippery. Each animal should be rather closely confined by himself, as there is less danger of the momentum in starting and stopping being transmitted to other animals. In no case should a horse be loose with a great amount of room, as he is likely to be thrown about and injured. Horses should be fed sparingly and watered as frequently as possible in transit. They should be unloaded and allowed to rest and be fed as often as practicable.

So far as possible, large sale stables in shipping centers should be avoided, especially with "green horses," as these places are usually infected with influenza, and the strain of shipping renders the horses peculiarly susceptible to this and other diseases.

The quarters in which horses are confined for shipment should be well ventilated; there is little danger of the animals' taking cold if their bodies are well protected by stable blankets. The injury resulting from impure air in close quarters is likely to be much greater than that following undue exposure. If a horse gets down, in transit, he should be gotten on his feet as soon as possible, as there is danger of the other horses' trampling and seriously injuring him. After unloading, the animals should be allowed to rest and should be fed lightly and given gentle exercise until their normal con-

dition is resumed. Horses are sometimes very hungry when unloaded and are likely to overeat and so bring on indigestion, which is aggravated by the tired, nervous condition, change of food and surroundings. Small doses of saltpeter, a teaspoonful twice daily, are useful to stimulate the kidneys, and to remove dropsical swellings. Bran mashes should be given until the bowels become normal.

"GREEN" HORSES

By the term "green horses" is meant horses that are rather fat and not accustomed to the work, surroundings, and climatic conditions to which they are subjected. The term is usually applied to horses that are shipped into a locality from a distance. After a horse is broken in, becomes accustomed to his work and is acclimated, he is said to be "seasoned."

Green horses should be handled with great care and good judgment for the first season, as they are very likely to be injured by overwork. They are usually fat and out of condition as a result of being fitted for the market, and, while in good spirits and ambitious, should not be given hard work, either in driving or pulling. Light work for green horses the first season will repay in longer service and greater efficiency. Most horses are overworked, their ambition destroyed, and their life shortened by too severe labor before they are seven years old. Because a horse is young, active and ambitious there is a tendency among many to allow him to use his strength lavishly, and a debilitated, "played-

out" and unsound horse results at an age when he should be in his prime.

TRAINING AND HITCHING UP HORSES

In some localities it may be cheaper, as a matter of economy, to buy horses than to raise them; and yet there is more real value in raising a colt than the money which he represents. The satisfaction that comes from the selection of the sire and dam, the pleasure and interest that a little colt excites in every one interested in horses, and the breaking and training of the colt to usefulness and service, are much more valuable to the boy or man who assumes the responsibility, than is the colt when measured by dollars and cents. Not every person is fitted by nature for the care and handling of colts, as the large number of vicious and spoiled horses indicates. And yet every one possessing good judgment, a familiarity with horses, and patience, can attain a tolerable degree of success.

Among the other qualities which are transmitted from parent to offspring, especially in horses, is the disposition; and a horse possessing an ugly or vicious disposition should not be bred, unless he possesses other qualities that are superior. When such an animal is bred, it should be mated with an animal of the opposite temperament. The colt's training should begin early, while he can be easily handled and controlled. Little colts learn readily, are seldom vicious, and are more valuable when they are broken young.

In breaking and training horses, a few "command-

ments" may be laid down, and should always be kept in mind. A horse should never be trusted more than is necessary. A good horseman never runs risks if he can avoid it, and when risks are necessary, he always reduces them to a minimum by care and forethought. Many distressing accidents occur from trusting old "family" horses. Unexpected circumstances are liable to arise at any time that require good judgment, and some strength and skill, in the handling or controlling of horses. The harness and other equipment should be of good quality and in good repair. Children, women or incompetent men should never be left in charge of horses unless the animals are securely tied. Horses should be tied about the neck by a strong rope or strap, the latter passed through the ring of the bit, or by some similar arrangement. A horse should always be tied short; if tied long, he is liable to get his feet over the rope, to cramp the vehicle, to get his nose on the ground, to step on the lines or bridle; and if he becomes frightened he has much more chance of freeing himself. In driving, a whip should always be carried; while it may be seldom necessary to use it, yet when it is needed it is usually needed very badly. The lines should always be kept within reach.

A horse should never be allowed to get the advantage of a driver, or to get from under his control; for once he learns that he is superior to the driver he is usually ruined. The driver, by firmness, gentleness and force of character, should control the horse. Aside from the damage which may be incurred by a horse's bolting or running away, an attendant may be hurt by

the horse's biting, striking or kicking him. The safest way of handling a fractious horse is for the attendant to stand close to his left shoulder, grasping the bridle or halter close to the mouth with the right hand. In this position the horse is unable to injure him. If the horse gets loose, or makes an attempt to do so, the attendant should stay close to him, or else get clear out of the way. There is no "happy medium." Many serious accidents occur from horses' rearing and striking, or kicking in play. In catching horses in the pasture, care should be taken, in approaching the animal, that he does not whirl and kick.

In leading horses with a halter, an attendant is sometimes unable to hold the animal. By looping the rope or tie-strap and slipping it into his mouth in the place of a bit, then running the rope through the nose-band, thus forming a loop around the lower jaw, he can be easily controlled. In leading or driving horses, cattle or other large animals, the line or rope should never be tied or wrapped around the body or hands of the attendant.

In harnessing, dressing, or handling a horse, the work should be done from the left or "nigh" side of the animal; the harness, saddle and equipment fasten and unfasten on this side. In putting on the harness it should be gently but firmly placed upon the animal, pains being taken that it fits well, and all loose, flapping straps avoided. In hitching a horse into a pair of shafts, the shafts should always be raised up and the animal backed into them, or the vehicle drawn forward, as the horse is likely to step on a shaft and

break it if backed into them while they are on the floor or ground.

In hitching up horses, the lines should be fastened into the bits and then disengaged and placed where they can easily be reached before hitching the horse to the vehicle; in unhitching, the lines should be the last part of the harness to be "done up," and precautions should be taken that the animal is free from the vehicle before attempting to lead him away.

BREAKING COLTS

In breaking colts, the common mistake is made of trying to teach them too much at once. Be sure that the colt understands the first lesson and has it thoroughly learned before another one is attempted. One of the first lessons is to "halter-break" the young colt. This should be done while he is a suckling. A strong, well-fitting halter should be placed on him, and he should be tied short near to his mother and in such a position that he cannot pull back too far or throw and choke himself. Fig. 24. Colts should always be tied strongly so there is no danger of breaking loose, for if he breaks loose once he is very likely to try it again. Little colts should be gently but firmly treated, so that they will have confidence in the trainer. Avoid making great pets of colts, as such animals are usually difficult to break, being lawless and headstrong. After the colt is well halter-broken, so that he can be tied and led, it is a good plan to allow the colt to accompany the mother by tying his halter to her hame or collar; thus he

becomes used to walking and trotting beside another horse. The only objection to breaking colts young is that, being broken, they are likely to be driven or worked too hard before they are well developed or strong enough. A bitting bridle should now be put on for an hour or so a day, until he is familiar with it. An "open" bridle,

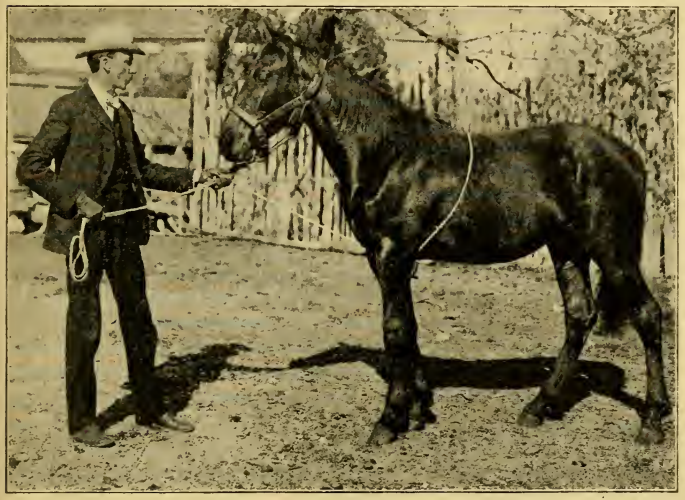

Fig. 24. Breaking colt to lead

or one without blinders, should always be used at first, so that the colt can see and familiarize himself with all that is going on about him. A "blind" bridle can then be put on at any time. If a horse is broken in a blind bridle, great care must be exercised in changing to an open bridle, as he is very liable to be frightened by the glimpses he gets of the vehicles coming after him.

Choice between open and blind bridles must be governed by circumstances. A driving horse used with an open bridle generally "knows too much," and often assumes that, because he has seen a person get into the vehicle, he is ready to start; or, because the driver takes the whip he expects to receive a "cut"; and he often jumps when it is not desirable. Horses which "shy" at objects along the road usually go much better when carefully driven with an open bridle.

In breaking colts, a large, smooth bit is to be preferred. There are on the market some slightly flexible leather-covered bits that are excellent. A straight or a single-joint bit is generally used. After the colt is thoroughly familiar with the bitting rig, a saddle, back strap and crupper of a single harness should be carefully put on and be kept on for an hour or two daily until he is used to it. When this is accomplished, a bridle can be put on, the lines passed through the tugs, or loops made for the shafts, and the colt driven. By passing the lines through the tug loops the colt can be prevented from whirling around and getting tangled up in the lines. It is usually a good plan to have an attendant lead the colt until he understands what is expected of him.

One of the first things to teach a colt is to stop at the command "Whoa," and to stand. The command should be used for the one purpose of making him stop. Many drivers use the word frequently in driving nervous or irritable horses, but, instead, they should use other encouraging or soothing words.

After the colt is broken to drive single, the breeching

and traces should be attached and arranged so that they will not flop, and the colt hitched up with a reliable, but quick-acting horse. It is a mistake to hitch a quick, active colt with a slow, lazy horse; his actions will be very irritating and confusing to the colt. After being driven double a while, the pair may be attached to a substantial vehicle. When hitching a colt up double for the first time, it is a good plan to keep a pair of single lines on the colt's bridle, which can be handled by an assistant.

In hitching up double, a good, heavy wagon is preferable, and especially one with a brake. The colt should be placed on the "off" side, as he is more easy to manage there, and can be touched with the whip better. After the colt is familiar with the harness, wagon and equipment, he can be hitched up single. Some horse-trainers prefer to break the colt in shafts before hitching him up double. A breaking cart for hitching up colts single should be substantial, with long, heavy thills, and the seat arranged behind so that the driver can get on and off quickly. The colt should be hitched far enough forward in the shafts so that he cannot kick to do any damage. A strap (commonly called a kick-strap), attached to each shaft and passed over the colt's croup, should always be used until the colt is well accustomed to the thills.

When the colt is first hitched up single in a two-wheeled cart, an attendant should hold him until the driver is ready, then he should be allowed to go. As soon as he becomes familiar with the cart, he should be compelled to stand until he is told to start.

Teaching a colt to back is usually best done by placing him in a double team with a horse that will back well, the wagon being in a favorable position so that little force is required to move it. An assistant takes the lines and tells the colt to back, while the trainer takes hold of the colt's bit on either side and assists in forcing him backward. If he refuses to go, a slight cut with the whip across his front legs, or tapping the legs with the toe, will cause him to step back. Time and patience are often required to teach a colt to back well. He should always be forced to respond to traction on the bit, even if a cut with the whip is necessary. He should not be allowed to twist his head and neck around to one side without moving the body. In teaching a colt to draw, he should be hitched with another horse of his own temperament and agility. The loads should at first be light, increasing gradually as he becomes familiar with the work. A young horse, not accustomed to pulling, should never be hitched to a load if there is any doubt of his ability to move it readily.

WILD OR VICIOUS HORSES

In breaking or handling vicious horses, the most important thing is to impress them firmly with the idea that the trainer has complete control over them and that they must obey him. A horse that thinks he can do as he wishes is difficult to deal with. One of the methods of managing a vicious horse is, if, understanding what is required of him, he refuses to obey, to throw him down and hold him there until he gives up.

While down it is often a good plan to crack a whip close to him, and, when he struggles, to hold him firmly, by keeping his head down. After he ceases struggling and gives up, the horse should be allowed to get up. Then try him with the lesson again. If he refuses, throw him down at once, and repeat the process until he is ready to do what is required of him.

Another method that works well in some cases and is less trouble, is to strap up one fore leg and make him go on three legs. This is a good plan when the horse has a tendency to run or to kick. After he is satisfied that he cannot get loose and is under complete control, the strap can be removed. If, when hitching a horse up, there is fear that he may run or act in a vicious manner, straps with rings should be buckled below the fetlock on each fore leg, a small rope tied securely in the ring of the strap on the right leg, passed up over the belly-band and down through the ring on the left fore leg, then passed up over the belly-band again and held by an assistant who walks or rides with the trainer. In case of trouble, the assistant, by pulling on the rope, can hold up one or both fore feet. If a horse shows a tendency to kick, a sharp twitch on the lines will often distract his attention and prevent kicking. Frequently, when a horse is nervous and irritable, placing a blindfold over the eyes will direct his attention elsewhere.

BALKY HORSES

Balking is refusal on the part of a horse to do his required work when he understands fully what is

wanted. It is an extremely aggravating vice, and one that is likely to render a horse practically worthless.

Balking may be due to a naturally vicious disposition, or to improper handling; it is often a combination of both. The more experience one has in dealing with this trouble, the less he feels like giving advice. The first thing to be done is to get acquainted with the horse and all his peculiarities; then the trainer must exercise his ingenuity and knowledge to overcome or circumvent the animal.

Balking varies from a disinclination to do some slight act in some particular place or at some particular time, to a disinclination to do anything that may be required at any time. Associated with the disinclination to work, there is often a tendency to do some annoying act that he ought not to do. Balking is often associated with a nervous temperament, and all influences that tend to irritate the horse should be removed if possible. In dealing with balky or vicious horses, it is important that the trainer be quiet, persistent, and, above all, that he does not lose his temper. Shouting, jerking and whipping a balky horse is likely to make a bad matter worse. If punishment in the form of whipping is to be given, it must be given judiciously and thoroughly. In many cases of balking, if he is allowed to stand quietly until the nervousness has passed away, the horse will start of his own accord. Attracting his attention by adjusting the harness, or by giving him an apple or a bit of sugar, will often overcome a difficulty that cannot be whipped out of him. A horse that balks, and throws

himself, and refuses to get up, is hard to deal with. In most cases, turning a hose into his mouth, nose and face will make him get up. In the absence of a hose, water can be dashed on him from a pail.

In bad cases of balking, throwing the horse and holding him down until he is ready to go is often an effective way of treating him. Every case has to be dealt with according to the particular circumstances. As a general rule, balky horses can be coaxed better than they can be forced.

REARING, OR "RARING"

When a horse has a tendency to rear on his hind legs, fasten a small rope to one or both forward fetlocks, so that you can pull his feet from under him as he comes down. This will usually cause him to stop this vice after a few trials.

HALTER PULLING

This is another annoying vice, caused by the horse throwing himself backward on the halter with all the force that he can; unless he is securely tied he is likely to break loose, and he often does other damage. All horses that have this habit should be securely tied by a stout neck strap or rope. They can sometimes be broken by tying a small (about one-fourth inch) rope around the body just back of the fore legs; the rope is then passed between the front legs, through the ring of the halter, and tied to a post. When a horse

throws himself back on this a few times he will usually cease. Another method is to tie one end of the small rope about the tail in the form of a crupper, the other end being passed through the halter ring and tied to a post. In this case, when he pulls the force is exerted upon his tail and he soon stops.

PULLING ON THE BIT

This is a bad habit and one difficult to remedy in some cases. A horse that tugs on his bit continuously, or even for a part of the time, cannot be driven with any pleasure. This vice is often due to errors in breaking. In driving a horse that pulls on the bit, the more the driver tries to hold him, the more he pulls, especially if he gets nervous and irritated. A harsh bit that hurts his mouth is likely to increase the irritation.

In dealing with a horse that pulls on the bit, it is usually a good plan to use as easy a bit as possible, as some of the flexible leather-covered bits. Then try to teach the horse that it is not necessary to pull on the bit as he travels. When he begins to pull on the bit, allow him to go without trying to hold him, never allowing him, however, to get beyond the control of the driver. When the horse finds that no one is trying to hold him he will often give up pulling. Some cases can be stopped by tying the pulling horse to his mate.

RUNAWAY HORSES

It is impossible to stop a thoroughly frightened horse that is running away, by pulling on an ordinary bit.

There are bits made that enable the driver to close the nostrils, and thus to stop the horse's breathing so that he will soon "choke down." There are other kinds of bits that are very effective. By acting quickly and vigorously, a driver can often prevent a horse from getting beyond control. If it is possible to rein the horse into a wall before he has acquired much headway, it is usually a good plan. When a horse is beyond control, and is running rapidly, it is generally the safest plan to guide him, so far as possible, and to allow him to become exhausted, when he can be stopped. There is usually less danger in staying with a horse that is running rapidly than in attempting to jump. Every case must be decided as the varying circumstances will indicate. Runaway horses are always dangerous, and should be treated accordingly, and no person not fully qualified should ever be allowed to handle them.

CHAPTER V

THE HORSE—LAMENESS AND SHOEING

In treating lameness in animals, it must be remembered that one of the most important essentials to recovery is rest. There are few forms of lameness that can be treated successfully when the animal is at work, especially when that work is responsible for the lameness. In treating lameness, the affected limb is to be kept as quiet as possible until some time after the symptoms have disappeared, in order that the diseased or injured tissues can regain their healthy condition.

Turning horses out to pasture for some weeks is often all that is necessary. This takes the animal off the hard floors and roads upon which much time ordinarily is spent. In many cases, if the cause of the lameness can be located and removed, a good blister put on the affected part, the shoes taken off and the horse turned out to pasture, may result in a complete recovery in a short time. When there is danger of the animal's breaking the hoofs badly while in rough pasture, or from stamping flies, the hoofs can be protected with light tips.

In many cases in which the feet of roadsters have been injured by fast driving on hard roads, light work on soft plowed ground, barefooted or with tip shoes, will often take the place of a run at pasture. The

same treatment is good for draft horses, when the feet have been injured on pavements. It will in most cases give relief and often effect permanent recovery.

DIAGNOSING LAMENESS

Lameness is a defect in the natural gait of an animal. In some cases there is a normal "hitch" in the gait. Such a peculiarity is not easily distinguished from true lameness, especially when the horse is pushed to the limit of his speed in trotting. It is an idiosincrasy and does not need treating.

Lameness may be due to some deformity which, though it causes a noticeable limp, may occasion the animal no pain and but little inconvenience in traveling. Most cases of lameness, however, are due to some disease or injury that not only interferes with the locomotion, but causes the animal suffering.

Lameness is at times difficult to locate; therefore it is not easy to give directions for distinguishing the various lamenesses of animals. Experts often seem to diagnose cases of lameness intuitively, and are sometimes unable to tell why the disease is located in a certain spot. Close and careful observation of the form and movements of the legs, both in health and in disease, are essential to accuracy in diagnosis.

Most cases of lameness in horses occur in the front legs. These bear one-third more weight than the hind legs, and in ordinary traveling they are lifted higher and brought down with greater force; hence, their liability to injury is increased.

There is a popular belief among horse owners that shoulder lameness is very common, but this is an error. Shoulder lameness is extremely rare. Nearly all lamenesses of the fore leg occur below the knee, and most of these are in the foot. In the hind leg most cases of lameness occur in the hock joint, or below it. Hip-joint lameness is very rare.

In locating lameness it is best to examine the animal while he is moving, preferably on a hard road at a trot, and without check, harness or blanket. The person leading the horse should give him as much freedom of the head as is possible. The horse should be seen passing by, coming toward, and going from, the observer. He should also be turned in short circles to the right, then to the left, in order to bring the weight on the right and the left legs alternately.

When the lameness is in one leg, the horse will usually drop on the corresponding well leg as soon as possible, with a movement that is easily recognized. In standing, the weight is taken off the lame leg, and this leg is placed in a position that will give the most relief. When the lameness is in both front legs, the animal moves with a peculiar stiff or stilted motion, and when standing shifts the weight uneasily from one leg to the other. Aside from the symptoms of lameness that are shown when the animal is in motion, a thorough examination of the affected limb should be made by manipulating and feeling of it for signs of soreness, inflammation, bunches, depressions or swellings. An amateur should always make a careful examination of the foot, as most lamenesses are located here. The shoe

should be removed, the nails examined for signs of blood or pus, and the bottom of the foot cleaned and examined for punctures or bruises.

In manipulating to detect soreness, one must not be misled by the animal's flinching when the muscles of the shoulder are firmly pressed. Horses are likely to flinch from pressure here. In feeling for soreness or heat in a part, it is always well to study and compare the corresponding leg. In examining the foot, a small hammer is excellent with which to tap the different parts of the hoof to induce flinching. To determine heat in a part, aside from the touch, the corresponding parts of each leg are wet and note is made of the one drying first. In cases of suspected foot lameness, the animal may be driven, the degree of lameness noted, and a five per cent solution of cocaine may then be injected with a hypodermic syringe over the nerves on either side of the tendon, in the hollow just above and back of the foot. If the lameness is in the lower and back part of the foot, it will be stopped or greatly lessened temporarily.

SWEENEY, SHOULDER LAMENESS

While shoulder lameness is rare, one form that is met with, particularly in young horses, is called sweeney. It is a rapid wasting away of certain muscles on the outside of the shoulder-blade.

Sweeney is caused by severe pulling, especially in young horses when first put at hard work, such as plowing. The blood vessels or nerves of the affected

muscles seem to be injured by the pressure of the collar. While sweeney is commonly caused by plowing, any hard, continuous pulling may produce it.

In many cases there is a lack of definite symptoms, the first thing noticed being a wasting away of the muscles on the outside of the shoulder-blade, and a lack of proper use of the corresponding front leg. In a few cases there may be marked pain, as shown by sweating, rolling and pointing the nose toward the shoulder, with a temporary swelling of the muscles. These symptoms are followed by the wasting of the muscles.

Severe and long-continued cases of lameness in the fore leg often cause a gradual wasting of the muscles of the shoulder from a lack of use of the leg. The same condition occurring in the hind leg is sometimes called "hip sweeney," but such wasting of muscles from disuse is not properly so called. In sweeney, the muscles on the outside of the shoulder-blade seem to disappear; the skin appears to grow fast to the bone, and the form of the bone can be plainly seen as it moves beneath the skin. In using the leg, the animal swings it outward. In most cases of sweeney, the horse is but slightly lame.

To treat, remove the cause. If necessary to work the animal, a perfect-fitting collar should be used, and the work made light. The skin over the affected muscles should be loosened from the tissues beneath by manipulation. Rubbing the muscles, and using a mild liniment, is good. A seaton of tape inserted beneath the skin over the affected muscles, beginning at the top and brought out below, or two or three light blisters three weeks apart, in most cases will effect a cure. Hand-

rubbing with liniment is preferable. Two months should be allowed for a complete cure. In cases in which there is a wasting of the muscles of the shoulder with severe lameness, the cause should be sought in the leg or foot, and when the lameness is removed the muscles will resume their normal shape.

LAMINITIS, OR FOUNDER

This is inflammation of the sensitive laminæ or plates of the foot. It usually affects the front feet, but may occur in all feet in rare cases. This disease is also called "chest founder," as it was once supposed that the apparent wasting of the muscles of the chest brought it on. Inflammation of the feet may not be confined to the sensitive laminæ, but may extend to all the sensitive structures inside the hoof.

Injuries to the feet, either from accidents, or from the concussion of hard and fast driving, long and severe drives, or driving a horse through cold water while warm, may cause inflammation of the feet. Feeding or watering a horse when he is very warm or tired, or a sudden and violent change of food, may also be causes of the trouble. Laminitis frequently occurs in cattle that are on full feed and in oxen or other animals following long drives.

Inflammation of the feet may be severe and acute, or it may occur in a milder, persistent chronic form, the symptoms varying much with the type of the disease.

Acute laminitis is usually found in the front feet. There is difficult locomotion, the horse dislikes to bear

weight on the inflamed feet, and when forced to move does so with a stiff and stilted movement. He can hardly hobble along. When standing, he places the front feet as far forward as possible, and draws the hind feet well under the body, in order to take the weight off the inflamed feet. This position causes the muscles of the breast to relax, and, apparently, to disappear; but as soon as the horse assumes the normal position the muscles are seen. Laminitis may start with a chill, followed by a rise of temperature, 103° to 104° F. The pulse is full, bounding, and rather hard to the touch. The affected parts are hot, and there is a distinct throbbing of the arteries of the foot. In some cases the horse may lie down and roll with pain, and there may be severe diarrhœa.

The shoes should be pulled off and the horse placed in well-bedded quarters that will tempt him to lie down. This position lessens the pain and favors recovery. The affected feet should be wrapped with soft cloths or packed with moss, and kept wet with cold water to reduce the inflammation. A heaping tablespoonful of saltpeter may be given three times daily as a drench. In case the cold water does not relieve, try applications of hot water for twenty minutes at a time, every two hours.

Chronic laminitis may develop from an acute form, or it may gradually appear as the result of mild but persistent irritation. It varies from cases that show but a very slight soreness in the front feet, to those in which locomotion is difficult. The causes are, in general, the same as for acute laminitis. It is frequently

the result of driving on city pavements, the repeated concussion setting up a chronic inflammation.

The symptoms are not so marked as in the acute form. The horse places the feet well forward in standing, or shifts the weight from one foot to the other. In obstinate cases, the outline of the front of the hoof is concave instead of straight and the hoof is marked by circular rings of horn. The hoof is hard and dry, and the heels are likely to be contracted.

Treatment for chronic laminitis is rarely very satisfactory as far as a cure is concerned, but it will often give much relief. If possible, the horse should be placed in a clay stall, or the feet may be soaked in a tub for two hours twice daily, wiped dry and oiled with the following hoof-dressing:

Turpentine	1 ounce
Pine tar	1 ounce
Beeswax	2 ounces
Fish oil	4 ounces

Melt together, and apply twice daily with a brush to all parts of the foot. In the absence of the hoof-dressing any good oil or glycerine may be used. Horses that are foot-sore or tender can be benefited by shoeing with broad webbed bar shoes, with rubber heel pads beneath to lessen the jar. Light blisters applied to the coronets (top of the hoof) once in four weeks may be beneficial.

COFFIN-JOINT LAMENESS

This disease is also called "navicular disease" and "navicular arthritis." It is an inflammation of the

under surface of the navicular bone and the tendon that passes over it. It occurs in the front feet, and when well established is practically incurable. It is usually found in horses that are good drivers, and is one of the serious diseases to which fast horses are liable. It is rarely seen in draft horses.

The disease comes on gradually without apparent cause. The horse points the affected foot out while standing. There is little, if any, noticeable inflammation in the foot. In moving, the horse does not bend the coffin-joint as much as usual, and as a result digs the toe into the ground, and in placing the foot down strikes the dirt up forward. There is a decided lameness that does not disappear to any extent by driving, and may get worse. The horse prefers to stand on the toes as much as possible, and as a result the heels are likely to be unusually deep. The disease may be easily diagnosed by injecting cocaine over the nerves.

In the early stages, remove the shoes and poultice the foot, giving plenty of rest. When the trouble is well established there is no cure; the only treatment is a surgical operation commonly called "nerving" and technically known as neurectomy, or neurotomy. The operation consists in cutting out a section of the nerve that supplies the diseased part. This destroys all sensation, but it does not cure the disease.

There are two methods of operating — the "high," when sections of the nerve are removed on both sides of the leg above the fetlock, and the "low," when sections of a nerve are removed on either side in the hollow below the fetlock. In the high operation all sensation

in the foot is destroyed; in the low operation the sensation is destroyed in the lower and back part of the foot only.

The writer advises the low operation in all cases when it will give relief, and this is easily determined by injecting cocaine (five per cent solution) over the nerves at the seat of the operation. If properly performed, no bad results follow the operation and the horse gets relief from pain. When the low operation will not give relief, and the horse suffers pain, the high operation is to be recommended. The objection to the high operation is, that in some cases there is likely to follow degeneration of the tissues of the foot to such an extent as to necessitate a destruction of the animal. Yet an animal generally gives years of service, without pain, when he otherwise would be useless. Neurectomy, if properly performed under the effects of cocaine, is practically painless, and cannot be considered cruel. In fact, the cruelty lies in allowing a horse to suffer when a simple operation would give relief. The writer does not recommend neurectomy when it is to be performed at any point above the knee or fetlock, except in rare instances. The indiscriminate practice of neurectomy is bad; the operation is not a "cure-all," and is to be employed only after careful consideration, for a specific purpose, and by a skilled surgeon.

CORNS

Corns result from bruises of the sole. They always occur on the inside half of the sole of the front

feet, in the angle formed by the bar and the wall of the inside quarter. They usually result from stepping upon stones or other hard substances. Horses with flat, weak feet are more liable than others to have corns.

There is severe lameness; the horse tries to step on the outer edge of the foot as much as possible. The lameness is most marked when the horse is driven on hard roads. In standing, the leg is bent to take all weight off the affected foot. If the foot is examined, a dark brown spot will be seen where the corn is located. Tapping this spot with a hammer causes pain.

In most cases the dark spot is a collection of blood or pus that needs to be removed. A hole cut through the sole of the foot, allowing this fluid to escape, gives relief. The hole should be washed out and turpentine, white lotion or a five per cent solution of carbolic acid in water applied. The shoe should be removed and the animal kept in a clean stall. As soon as the discharge ceases, a little pine tar can be applied to the opening to keep out the dirt. In treating corns, avoid burning with caustics unless "proud flesh" forms, as this is likely to injure the tissues and interfere with the growth of new horn. A broad webbed bar shoe should be put on with a leather between the sole and the shoe. The leather is to be kept on only a few days until the horn grows a little, or it is likely to collect dirt. Horses subject to corns should be shod with wide webbed bar shoes to protect the feet. Wearing a shoe for too long a period without resetting so that it bears on the sole of the foot may cause corns.

QUITTOR

Quittor is a name applied to a running sore or fistula occurring at the top of the hoof or coronet. It is sometimes called "gravel."

Quittors are the result of some injury, such as treads or calks of a mate, nail pricks in shoeing, "picking up a nail," corus, or puncture of the sole of the foot that allows gravel or other foreign bodies to get in and injure the soft tissues.

In the early stages, soon after the injury and while pus is forming, there is severe lameness. The pus, unable to break through the horny hoof, works its way to the top and there breaks and discharges. In many cases, the part heals without any treatment, but in others, a chronic running sore forms. In the chronic form the horse may not be very lame

In the early stages of the quittor, pull off the shoe and apply a good poultice, spread on a strong piece of cloth. By tying it above the hoof, it can be kept on for two days, but it should be changed frequently. Apply the poultice as hot as the animal can bear it, and when removed finally the foot should be washed and greased. As soon as pus has formed, the sore should be opened and washed out with a good antiseptic. Pure tincture of iodine should be injected twice a week, and the fistula washed out every other day with warm water to which is added a mild antiseptic. The treatment is the same as for a fistula of the withers. Quittors of long standing may have to be operated upon surgically to remove diseased tissues, before they will heal.

PUNCTURED WOUNDS OF THE FOOT

These are wounds made by some sharp object puncturing the sole or the frog and injuring the soft tissues. They are likely to be serious, as the coffin-joint is often punctured, and tetanus (lockjaw) follows in other cases. Generally the injury arises from "picking up a nail" or from the prick of a nail in shoeing. In all cases of sudden and decided lameness, the foot should be carefully examined for nails and similar objects, or for holes which they have made.

The nail or foreign body should first be withdrawn. If there is a collection of blood or pus, the hole must be enlarged, so that there is free drainage, and the sore washed out with a good antiseptic. One part of peroxide of hydrogen to three of water is excellent; so is a five per cent solution of carbolic acid in water, pure turpentine, or a 1-to-1000 solution of corrosive sublimate. If there is much soreness, the foot should be poulticed for a day or two and then treated as a corn is that has been opened. The horse should be kept in a clean, dry stall, so that no dirt will get into the wound.

THRUSH

Thrush is a deep fissure in the horny frog extending to the sensitive frog and is associated with some inflammation of the latter and the discharge of a small amount of bad-smelling pus from the cleft of the frog. It occurs in either the front or the hind feet, most frequently in the latter. It is caused in most cases by

standing in manure and filth, but sometimes it occurs without apparent cause. Often it precedes other diseases of the foot, and seems to be brought on by a debilitated condition of the system.

There is a crack in the horny frog with a foul-smelling discharge. There is lameness or tenderness, especially when the foot strikes some hard object. The hoof is dry and the heel feverish.

Poultice the foot to soften the parts, trim away the edges of the cleft so as to get at the seat of the disease, make a swab and cauterize the cleft thoroughly with "butter of antimony" or some other liquid caustic. After using a caustic once, calomel can be dusted into the cleft once daily; this dries up the discharge and in most cases will cure the disease. Compound tincture of benzoin and oil of tar, equal parts, is also good. The shoes should be removed and frog pressure given. If it is necessary to work the horse, "tips" or bar shoes can be put on. It is essential that the foot be kept clean and dry. If the horse is debilitated, good nourishing food, with tonic condition-powders, should be given. Pulling off the shoes and giving a run at pasture will often effect a cure.

CRACKED HOOFS

A "quarter-crack" is a crack in the wall of the hoof, beginning at the top or coronet, and extending downward in the wall. When the crack begins at the bottom and extends upward it is called a "sand-crack"; if in front it is sometimes called a "toe-crack."

In most cases cracks in the walls of the hoof are due to a dry, weakened condition of the walls. Severe exertion, especially fast work on hard roads, tends to split the hoof. Cracks may also be caused by an injury to the coronet, where the horny wall is secreted; this interferes with the growth of horn, and a crack results. Excessive growth of the wall in unshod horses may cause cracks.

Quarter-crack may cause severe lameness. The hoof spreads as the animal steps on it and the soft tissues are often pinched in the crack as the foot is picked up and the crack closes, thus causing the parts to bleed. Sand and gravel may get into the crack and cause trouble, or "proud flesh" may form that interferes with the healing. In some cases there is no lameness, and unscrupulous horse-traders sometimes hide the cracks by filling with soap, in order to dispose of the horse.

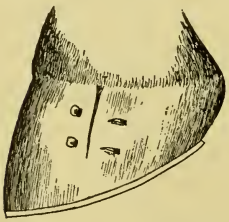

Fig. 25. Quarter-crack closed by nails.

The crack is to be neatly cleaned out; if "proud flesh" exists, it is to be destroyed with a caustic, antiseptics applied to the crack, and then pine tar, to keep out dirt and assist in healing. The crack should be drawn together by a shoeing nail driven across the crack, drawn tightly together and clinched (Fig. 25). It may be necessary to drill the holes for the nails, but in most cases a good shoeing smith can drive them. Small clips are made for this purpose, which can be fitted into grooves on each side of the crack, and closed by large

pincers. A light blister applied to the coronet where the crack starts will stimulate the growth of horn. Cutting through the wall at right angles to the point of the crack will often prevent the crack extending further. The hoof should be kept well oiled. Care should be taken, until it is well healed, that the horse is not subjected to severe exertion that will split the crack open.

SHOEING

Shoeing consists in fastening to the hoof of the animal some hard substance, usually iron. Shoes are applied for several reasons:

(1) Shoeing is employed to prevent the rapid wearing away of the horn of the hoof, and thus to prevent the feet from getting sore and tender when traveling. This is the reason for shoeing most horses. In some parts of the country it is not common to shoe horses unless they show the need of it by getting footsore when traveling, especially on a hard road. When horses show the need of shoeing, it is first seen in the fore feet. In many parts of the country, shoes are applied only to the front feet, except in rare cases in which the hind feet show signs of too rapid wear. For ordinary uses, a shoe without calks and just heavy enough to prevent bending is best; such shoes are often called "plates." If shoes are too heavy they are likely to tire a horse and make him leg-weary.

(2) When roads are slippery, from ice or other causes, or when horses are subjected to heavy pulling, it

is necessary to shoe them so that they can get a grip that will enable them to stand, or to pull loads. For this purpose shoes with sharp calks are usually put on. For horses that are used for rapid driving on asphalt paved streets, a rubber-faced shoe gives good results, as it not only prevents slipping, but it lessens the jar upon the foot. In winter, during icy weather, when horses are not "sharp" but have on smooth "plates," or shoes with the calks worn smooth, the horse can travel much better on icy roads if the shoes are removed entirely, as the horny hoof is less slippery than the smooth shoe. There are upon the market several kinds of shoes that have removable calks, so that in icy weather sharp calks can be inserted without removing the shoe. Such shoes give good service if they are looked after and the calks are not allowed to remain so long that they are difficult to remove.

(3) It is often necessary with horses that are intended for speed, or road work, to apply shoes of unusual pattern or weight for the purpose of modifying their action in some manner. Such shoes have to be made and set to suit each individual case. In heavy draft horses extra heavy shoes are sometimes put on the front feet to impart action to these members. Peculiar shoes are often applied to the feet to suit abnormal or diseased conditions; such an one is the high-heeled shoe used to give relief in bone spavin.

(4) "Tips" are sometimes used. They are thin steel shoes applied to the toe and allowed to extend a short distance on the inside and outside quarters (Fig. 26). They are like an ordinary shoe, except that they come

only half way back and are thin at the ends. They are applied by cutting away the wall at the toe until the tip can be put on and the foot kept level. Tips never have calks. The advantages of tips are many. They allow the heel to come to the ground, thus giving plenty of frog pressure, which is so important in preserving a healthy foot. The tip of steel protects the hoof from too rapid wearing away, and keeps the wall from splitting. Sole, heel and frog all coming in contact with the ground or pavement, the animal is able to get a good grip, and thus to avoid slipping. After a horse has been driven with tips for a time the hoof becomes tough and seems to wear away very slowly. If tips are well applied, they usually give excellent results, both on dirt roads and pavements.

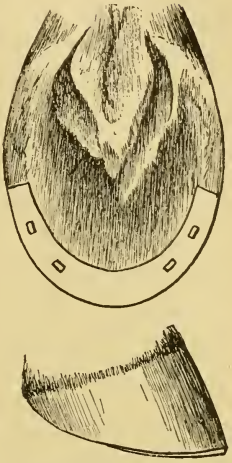

Fig. 26. Contracted foot shod with tip shoe

FITTING THE SHOE

The sole of the foot should be kept perfectly level, as any undue weight on one side of the foot may lead to injuries of the joints. All loose horn should be removed, and the wall of the hoof leveled with the sole. The bars should not be cut away, as they act as natural braces to the heels; and the frog is to be left in its

normal size and shape to act as a cushion for the foot. After the foot is brought to its normal form, the shoe should be made and fitted to it. The shoe must be of the exact size of the foot, so that it will come flush with the outer edge of the hoof. The nail-holes should not be very close to the edge of the shoe, for in that case it is necessary to drive the nails too far up into the wall to make them hold. The shoe should be fitted cold, or just touched to the foot while hot, never burned into position. The nails should be small, and when driven should be brought out well down on the hoof. If driven too high, when the horse is re-shod the former nail-holes are near the edge and serve to weaken the hoof and interfere with the driving of new nails. After the shoe is fastened, the nails are to be clinched in small grooves filed for the purpose. After this is done, the clinches may be smoothed with the rasp; but the outside of the hoof should not be rasped, as this will remove its natural protective covering.

Shoes should be reset every five or six weeks, as the hoof grows out over the shoe, so as to cause the shoe to bear on the sole instead of the wall of the foot.

Care should be exercised to keep the feet of colts in a normal form before they are shod, as irregularities of the feet are often the causes of disease. When shoes are pulled off and an animal is to go barefooted, the edges of the hoofs should be rasped off round, so that they will not split badly.

In devising special shoes for various forms of lameness or defective gait, the position that the animal assumes in travelling is a good indication of the kind of

shoe needed. For instance, if a horse steps on his toe, the inference is that it hurts him to bring the heel to the ground; hence, a high-heeled shoe will usually give relief.

For interfering, overreaching or forging, and other defects in gait, no definite directions can be given. Each case is best treated after a careful study of its own peculiarities. For all such cases as these, only an expert horse-shoer should be consulted.

CHAPTER VI

INDICATIONS OF DISEASE IN ANIMALS

MODERN veterinary medicine follows human medicine very closely, both in theory and practice, and the same methods of treatment are used in disease, except when the structure of the animal or other circumstances require a special modification. The days of bleeding, of violent purging, of large doses of vile drugs have passed, and with them have disappeared many mythical diseases, which were once a source of fear to stock-owners. Disease is no longer the mysterious visitation of Providence that it was then considered to be. Its causes are definite and in most cases well known. In those diseases whose cause is still unknown the fearful mystery of other days has disappeared under the scrutiny of definite scientific research.

The body of an animal is constructed upon the same general plan as the human body. It is well known that the differences between man and the animals is not so largely physical as mental. There is the same bony framework, with joints between the bones to give mobility, the bones being held together by strong bands of white fibrous connective tissue, called ligaments. Covering the bones and forming a large part of the body is the great mass of muscular tissue (lean meat), whose function is not only to move the various parts

of the body, but to assist the bones in giving protection to some of the more delicate structures and organs. Within the body is the digestive system, which receives and prepares the food for the use of the millions of cells which constitute the living body. To carry this prepared food to these cells is the work of the circulatory system, composed of the heart and the blood-vessels. The arteries carry the blood from the heart to the different parts of the body, the minute capillaries distribute it through the tissues, and the veins collect the impure blood and carry it back to the heart. Thence it passes to the lungs, where some of the waste matters are removed and cast out in the exhaled air. The respiratory system consists of the lungs, with their infinite number of air-cells, and the passages leading to them—the windpipe and its branches —through which pure air is taken in and impure air breathed out.

The urinary system, consisting of the kidneys and bladder and the tubes connecting them, serves the purpose of taking waste matter from the blood and excreting it from the body. Closely associated with this system is the reproductive system, which consists, in the female, of the uterus, or womb, and ovaries, and in the male, of the testicles, with the passages leading from them. The function of this system is the reproduction of the species.

Covering the outside of the body is the skin. Its functions are to protect the body, to throw off waste materials in the perspiration or sweat, and to serve as an organ of feeling or sensation. The nervous system con-

trols the whole body, making the different parts act in harmony. It enables the animal to comprehend what is going on around him, and to regulate his own activities. The brain, spinal cord and nerves, together with small masses of nervous tissue known as ganglia, constitute the nervous system.

When all of these different systems and parts of the body are complete and in their normal working order, the animal is said to be in a state of health. But when some parts of the body are injured, or their work is in any way interfered with, an abnormal condition occurs to which the term "disease" is applied.

It is essential that the observer be familiar with the actions of the animal, not only in a state of health, but also in disease,—since it is by comparison of these two conditions that disease is recognized. Signs of disease are commonly known as "symptoms." The study of these symptoms and the recognition of their causes is called "diagnosing the disease," or "diagnosis." The expression of an opinion as to the probable future course of the disease is called "prognosis," and, if favorable, indicates that the observer believes that the animal will recover; if unfavorable, that it will not. The following points are be particularly noted in examining sick animals.

PULSE

The pulse is the throbbing of an artery. By it is determined the heart's action and also the condition of the nervous system. In the horse, the pulse is usually taken where the submaxillary artery winds under the

lower jaw. By standing at the left side of the horse's head and running the finger gently along the lower jaw-bone, the artery will be felt just at the front edge of the large muscle at the side of the jaw. In taking the pulse of a cow, the person stands on the left side of the animal, but takes the pulse of the right jaw by reaching over the neck. In the dog and the sheep the pulse is usually taken from the femoral artery, which comes down close to the bone on the inside of the hind leg.

In health, the pulse feels full, round and regular, as it throbs against the finger. It varies in frequency in the different animals as follows:

Horse	30 to 40	beats	per	minute.
Cow	40 to 50	"	"	"
Sheep	70 to 80	"	"	"
Dog	70 to 90	"	"	"

The pulse beats more rapidly in young animals than in old. Excitement and exercise also increase its rapidity. The pulse varies not only in rate, but also in quality. The pulse may be "hard"; that is, the artery wall is not easily depressed by the finger. A "quick" pulse is one in which the beat comes up suddenly; but this does not necessarily imply a greater number of beats per minute. In fact, a quick pulse may be an infrequent one. A "slow" pulse is the opposite of the quick, the beat coming up very gradually against the finger. A "soft" pulse is the opposite of the hard. It is easily compressed by the finger. An "irregular" pulse beats unevenly,—very rapidly for a time and then very slowly.

An "intermittent" pulse drops a beat regularly, as, for instance, if every fourth beat be wanting.

The different conditions of the pulse are often strong symptoms of certain diseases. A soft pulse indicates bronchitis; a slow, full pulse, a disease of the brain; an intermittent pulse, heart trouble. An irregular, faint and fluttering pulse also denotes weak heart action A hard, quick, bounding pulse usually indicates acute inflammation. By practice the veterinarian becomes very skilful in diagnosing disease by means of the pulse.

TEMPERATURE

The temperature of animals is taken by means of a self-registering, clinical (fever) thermometer, inserted into one of the natural openings of the body, usually the anus or the vulva. The thermometer should always be shaken down before using, and allowed to remain in the body at least three minutes. The temperature of animals in a state of health ranges as follows:

Horse	100 to 101	degrees Fahrenheit.
Cow	100 to 103	" "
Sheep	101 to 103	" "
Dog	101 to 102	" "
Pig	102 to 104	" "
Fowls	107 to 108	" "

A rise in temperature, commonly called fever, denotes inflammation and a rapid oxidation of the tissues of the body. A rise in temperature of six degrees or more is likely to be dangerous, unless it is caused by some local condition that is soon removed. In disease,

a rise of four degrees is serious. A sudden fall of temperature below normal, unless due to some local cause, is always serious, and usually denotes waning vitality and the approach of death. A person who takes care of much stock should equip himself with a good clinical thermometer and familiarize himself with its use. He will find it a valuable aid in recognizing disease.

RESPIRATION

Respiration, commonly called breathing, consists of two movements—the taking in of air (inspiration) and the forcing out of air (expiration). In the horse there is usually one respiration to three pulse-beats. In health, a horse takes from twelve to fifteen inspirations per minute; a cow, ten to twenty-five, and a dog about twenty. Rapid breathing may be caused by excitement, by exercise or by excessive heat. The breathing is also faster when the animal's stomach is distended with food or with gas, or if, for any other reason, the capacity of the lung cavity is diminished.

Short, rapid or labored breathing usually indicates disease of the respiratory organs. Snoring indicates an obstruction of the air-passages of the throat or head, or it may come from disease of the brain. It often marks the near approach of death. Abdominal breathing makes prominent use of the diaphragm (midriff) and the abdominal muscles. It usually indicates soreness of the lungs, and in horses is a symptom of heaves.

Coughing is the forcible expulsion of the air from

the lungs, with a partial closure of the glottis. It is an endeavor to remove some irritating substance from the lungs or throat. There are two varieties of cough commonly recognized by veterinarians. The "moist" cough, in which mucus is expelled, accompanies an excessive secretion and collection of fluids in the air-passages. The "dry" cough is of a hacking nature and indicates irritation of the throat or lungs.

THE MUCOUS MEMBRANE

The mucous membrane is the soft, smooth, pink lining of all the natural openings of the body. It lines throughout its length the alimentary canal, and all other organs to which the external air may be admitted. If any mucous surface is congested and red, it shows a general irritated condition of this tissue. Such a condition is observed in the disease commonly called "pink-eye." If the mucous membranes are abnormally pale, it indicates a debilitated or anæmic condition of the body. A sudden and marked pallor of the mucous membranes accompanies an excessive loss of blood. If it is blue or slate-colored, a lack of oxygen in the blood is indicated. A yellow tint in the mucous membrane shows that the liver is deranged.

EXCRETIONS

The excretions of the body, the fæces (dung), urine and perspiration, vary, in diseased animals, not only in quantity and appearance, but often in com-

position as well. The excretions are an excellent index to the general condition of the bowels, kidneys and skin. During fevers the urine is scanty and highly colored. In azoturia, in horses, it varies in color from light brown to a dark coffee color, or almost black. In Texas or southern cattle fever, the urine of the affected animal is red in color. In mares, and sometimes in geldings, the urine is often thick and of a light yellow appearance in early summer. This condition is due to the large amounts of salts and mucus in the urine, and it is not a serious symptom. Some horses sweat profusely from slight exertion. In many instances this is due to an unusually heavy coat of hair. If this is true the coat should be clipped. In some cases of profuse sweating the kidneys are to blame. They may be stimulated to greater activity by small doses of saltpeter, a heaping teaspoonful twice daily, given for a few days. This will often overcome the trouble by relieving the skin of excessive labor as an excretory organ.

GENERAL APPEARANCE

Sick animals usually assume the position that will give most relief, or lessening of the pain, to a diseased or injured part. Therefore, a person attempting to determine its condition should approach the animal very quietly, and, before disturbing it, should carefully note its general appearance and posture. This is an important aid in determining the seat of the trouble. In taking the pulse, temperature and respiration, the

animal should be disturbed as little as possible. The appearance of the coat should be carefully noted. Is the hair erect, as is frequently the case during a chill?

Note the condition of the skin as to its feeling to the hand, whether harsh, scurfy or "hidebound." Such a condition usually indicates poor nutrition, either from lack of food or from some digestive trouble. The appetite should also be noticed, signs of the presence or absence of pain, dullness, or nervousness. In fact, the general expression of the face and the body is very important in diagnosing disease. If the animal is a female, the question of pregnancy, milk secretion or period of heat should always be taken into consideration.

A careful examination should always be made of the food and water. By inquiry, one should determine the work, lack of exercise, duration of sickness, and all other facts bearing upon the history of the case. An incidental remark, giving an apparently insignificant fact, often furnishes the clue which will lead to the correct diagnosis of the disease and to the determining of the cause. Animals having nervous diseases, especially those affecting the brain, should always be approached with great care, as they are often irresponsible and may do serious injury to those who treat them. This is notably true of dogs which show symptoms of rabies (hydrophobia). In examining or caring for animals that may be suffering from a contagious disease, precautions should always be taken to prevent the infection of persons, or the spreading of the disease to other animals by carelessness of the attendant.

POST-MORTEM EXAMINATION

It is frequently important to examine the body of an animal in order to discover the cause of death, whether from accident or disease, and to determine the nature of the disease. In order to determine any abnormal condition of the organs, a person familiar with the appearance of the organs in health should make the examination. A post-mortem examination should be made as soon as possible after death, as changes resulting from decomposition of the body or contents of the digestive system soon occur, and these changes are likely to mislead an inexperienced person. "Rigor mortis," or death-stiffening, usually begins soon after death, varying from one-half hour to twenty-four hours. It lasts, on an average, about thirty hours; then the muscles become softer and signs of decomposition soon follow.

The first thing to be observed in post-mortem examination is the position of the body, provided it has not been moved. Sometimes animals become "cast," or lie down in such positions that they are unable to get up without assistance, and then die. In other cases they may be caught in ropes, mangers or stanchions and injured sufficiently to cause death. Signs of struggling should be looked for, especially if poisoning is suspected. Malicious poisoning of stock, while frequently suspected, is extremely rare, except among dogs and cats. The two poisons most frequently used with malicious intent are strychnine and arsenic. When strychnine is used the animal dies in convulsions, and

there is evidence of struggling or of spasms. Struggling also occurs in many other forms of death. When arsenic is used there is irritation and inflammation of the stomach and bowels.

An examination should be made for abnormal discharges from the natural openings of the body. These may occur as a result of bloating or decomposition following death, or from the position of the body, which may allow their escape by gravity. In case the animal is a female and pregnant, evidence of parturition should be looked for.

The general appearance of the body should be noted, whether fat or thin, as indicating starvation or disease.

Signs of mange or itch should be looked for, as well as evidence of injuries, especially fractures of bones, punctured or gun-shot wounds, and hernias or ruptures. Bruises do not show plainly on animals until the skin is removed. Sores that come from lying in one position, or from struggling, are often important. In regions where Texas fever occurs in cattle, the skin on the abdomen and inside of the thighs and legs should be examined for ticks.

After a thorough external examination, the skin should be removed and the body examined for wounds or bruises. It must be remembered that, after death, the blood settles in the lowest parts of the body, and this must not be mistaken for disease. The color of the tissues should be noted. Abnormally black, or bruised, bloody-looking muscle, in young cattle, may indicate blackleg; or, in adult cattle and other animals, may be anthrax. The appearance of the blood is important,

as to its color and whether it is clotted. Thin black blood with a disagreeable odor indicates the presence of germs, and blood poisoning or a contagious or infectious disease is to be suspected. If the white tissues are abnormally yellow, a disease of the liver is indicated.

After the skin is removed, the fore leg on the upper side should be removed, the ribs cut off a few inches from the backbone and down the middle of the chest. The soft tissues should be cut and the whole covering of one side removed. This exposes all the organs in the chest and abdominal cavities. In cutting into the cavities, the quantity of watery fluid that escapes, its color and its odor, should be noticed. If an abnormal quantity escapes from the abdomen it indicates dropsy or a rupture of the bladder. In the latter case the characteristic odor of urine is present. If the fluid is red in color it indicates an inflammation of the bowels or the lining membrane of the abdomen, or the presence of blood. The fluid of the chest cavity is also important. An excessive quantity indicates an inflammation of the lungs. In this case there are usually fibrous adhesions between the lungs and the chest-wall.

The external color of the stomach and intestines is important. If red, the organs are congested; and if dark red or purple in color, inflamed. The presence of tumors, abscesses or growths on the intestines, liver, spleen or inside abdominal walls should be looked for, as well as the appearance of the gall-bladder in cattle, sheep and swine. The size of the abdominal organs is also important. The quantity, kind and condition of the food in the stomach and intestines are important,

as is the presence of foreign bodies, hair-balls and parasites in the intestines. Nails and other foreign bodies are frequently found in the reticulum or "honeycomb" of cattle, but are of no significance unless there is some local injury. Soon after death the digestive juices begin to digest the stomach, and may produce holes in its walls; and in cattle the lining membrane usually slips off in large patches. These conditions should not be mistaken for disease.

The kidneys and bladder should be examined for disease, or the presence of concretions, or "stones" or "gravel," so called. The color of the urine in the bladder is important. In horses, a dark red or brownish urine indicates azoturia; and, in cattle, Texas fever.

The color and consistency of the lungs are very important. The healthy lung is very soft, spongy and a very light pink in color. After death the blood usually settles in the lower lung, making it dark in color. If the lungs are hard and firm, and dark colored, inflammation is indicated. When an inflamed lung is cut across there is often a marbled appearance and usually a fetid odor of decomposition. In tuberculosis or consumption, hard lumps are usually found on the outside of the lungs, or on the chest-walls and diaphragm or midriff. (Fig. 56, Chapter XVI.) The lymphatic glands between the lungs are usually greatly enlarged, and these, with the lumps mentioned, are usually filled with a yellow cheesy material, or pus. The throat, esophagus and nasal passages should be examined for foreign bodies or food that may have choked the animal.

CHAPTER VII

TREATING SICK ANIMALS

THE sick animal should have the benefits of good nursing. By good nursing is meant the proper care of an ailing animal. Its aim is to hasten recovery from the ill effects of the disease. Most veterinarians of large experience, if required to choose between medicine and good nursing, would in a great majority of cases prefer to do without medicine, counting the nursing more important. A good nurse for ailing animals is one who understands them thoroughly, who can supply their needs, who is careful and attentive, studying always the well-being and comfort of his charges.

In all cases of disease in animals, one of the first things to be done is to look for the cause of the trouble, and if possible to remove it. This is not only for the benefit of the ailing animal, but for others which may be equally susceptible to the disease but have not as yet come in contact with it. There should be a careful examination of the surroundings of the animal, the work it has been doing, the food, water, general care, exercise, exposure, possibilities and sources of infection with contagious diseases, and other circumstances. It is true that in many cases there are severe and acute symptoms that require immediate and vigorous attention, such as colic in horses or bloating in cattle; but even in these

instances the course is the same—the real cause of the trouble should be sought for, and if possible removed.

Sick animals should be placed, as soon as possible, in comfortable quarters where the proper care and attention can be supplied. In many cases they will be found sick among the very conditions that have caused the disease, or that have at least weakened the animal's constitution. Surroundings may be injurious in various ways,—such as subjecting the animals to extremes of heat or cold or to inclement weather.

BOX STALLS FOR SICK ANIMALS

One of the most important things in the treatment of sick horses and cattle is a box stall of some sort, where the animal can be kept. There is probably no one thing so valuable, and yet so commonly lacking in farm barns. Not only in cases of sickness is it useful. It is a place in which to confine an animal when she is about to give birth to her young. It is invaluable for the immediate care of the young after birth, and for the confining of them at weaning time.

A box stall should be located where it will be dry and well ventilated, warm in winter, cool in summer. It should be 10 x 12 feet in size and high, to allow for good ventilation. It should be strongly made and ceiled on the inside and overhead, so that it can be readily disinfected. A plank floor should be laid. Dirt or paved floors, while good in some ways, are likely to be damp and cold. Earth floors cannot be disinfected easily. Two strong wide doors, one opening into

the barn and one into a smooth yard, are important adjuncts. The doors should not be opposite, as that would produce a draft. They should be made with independent upper and lower halves. The doors should be wide enough so that an animal can be easily carried in when unable to walk; and it is necessary sometimes to get him out while in the same condition. In the corner opposite the inner door, there should be a window, protected with bars and arranged so that it can be opened for ventilation, and darkened when necessary. In another corner should be placed a feed-box, which can be removed when not in use. There should be strong rings for tying and for drawing the head up for drenching. Strong hooks in the ceiling will be found to be useful.

In caring for sick animals, the quarters should be kept as clean, tidy and free from medicinal and other disagreeable odors as possible. The floors should be scraped frequently, but not washed, unless for some particular purpose, as washing makes the quarters too damp. If it can lie down, the animal should be well bedded with fine, dry, loose litter. In cases in which sick animals are disposed to eat the bedding, tan-bark, moss or even sawdust can be used. Bedding should be removed when not needed. The quarters should be kept at a comfortable temperature, and, above all, should be well ventilated, as pure air is essential in sickness. Sufficient light should be admitted to make the quarters cheerful, except that for special reasons and particular diseases the stall should be darkened. In some nervous afflictions and diseases of the eye dark-

ening the room may be necessary; also, to prevent annoyance from flies.

BLANKETS, BANDAGES, SLINGS

The sick animal can be protected against the cold or from drafts by covering with woollen blankets, the weight of the blanket being carefully adapted to the temperature. To protect the extremities, light woollen bandages may be applied, after rubbing the parts lightly to stimulate the circulation.

Bandages are applied for protection, warmth, support and for medicinal purposes. A "sweating" bandage is applied by first putting on a cotton bandage thoroughly wet with cold water and covering this with oiled silk or other impervious material to prevent evaporation. Bandages for protection or support are made from strips of woollen cloth, about three inches wide and six feet long. They are first rolled into a neat roll. In applying them, one begins at the lower or smaller portion of the part to be bandaged, and winds upward (Fig. 27). The adjusting of bandages so that they are smooth and remain in position without interfering with the circulation requires considerable skill. Woven bandages, which possess considerable elasticity, are more satisfactory than those made of ordinary woollen cloth.

Medicinal substances are often applied to a part by saturating the bandage; but care must be taken in applying liniments or other irritating substances in this way, as they may blister severely.

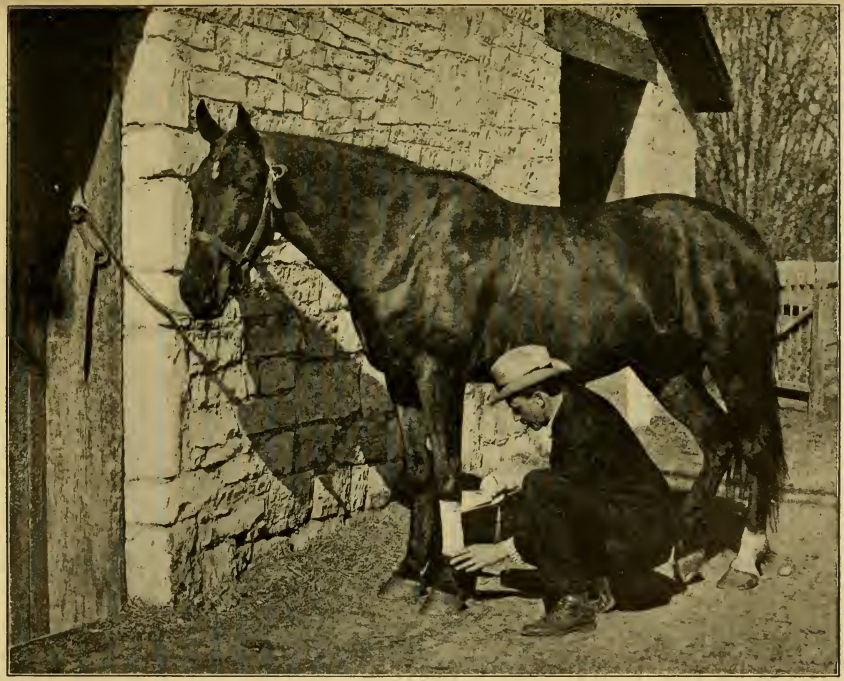

Fig. 27. Adjusting a bandage

A sling is frequently used in caring for sick or injured animals. It consists of a wide strip of stout canvas, placed under the animal and supported from above, usually by means of a chain and tackle, so that the weight of the animal may be taken off his legs and he still be kept in an upright position. In using slings, it is rarely advisable to attempt to carry the entire weight of the animal. The sling is usually placed under the animal so that he can settle into it of his own accord when he gets tired. It is sometimes necessary to raise animals by means of slings, but the animals are rarely suspended in them for any length of time.

When animals are unable to lie down for a considerable time, either from an injury or other cause, they will often rest themselves by leaning against supports. Wooden side supports can be placed in about the position that shafts would occupy on the horse. One should go across just in front of the breast, and, in case of an injury or lameness behind, another against the haunches. These supports should be protected by means of cloths or blankets. Animals are quick to take advantage of such things, and will get much relief by leaning against them. Such an arrangement is commonly called a "lean-to." Animals lying down can often be bolstered up into favorable positions by using sacks filled with bedding.

As a general thing, grooming sick animals lightly with hand-rubbing gives them relief. Exceptions must be made in some nervous diseases, when it is necessary to keep the animal free from all disturbances.

FOOD FOR SICK ANIMALS

The food plays an important part in the treatment of sick animals. In most diseases an effort must be made to maintain the strength of the body during the illness. If the animal can eat, then easily digestible, nutritious, but not bulky foods should be supplied, especially laxative foods that will keep the bowels open. Sickness usually brings on constipation, due largely to lack of exercise; and this condition should be overcome as far as possible by proper foods. The appetite of sick animals is likely to be very capricious, and is often wanting altogether. Therefore, food should be offered in as attractive form as possible. A small amount should be given at a time, and if it is refused it should be taken away at once. But the offer should be frequently repeated. To force food on a sick animal is advisable only in those cases when recovery depends largely upon the maintenance of strength. It is seldom a good plan to place medicines in the food or water, unless they are tasteless and odorless, as an animal is likely to become suspicious and refuse the food when it is important that he should have it.

Foods suitable for sick animals are fresh grass, roots, such as carrots, or apples from the hand, bran mashes, gruels and milk. These may contain beaten raw eggs, oats dry or boiled, or ground oats and bran mixed with cut hay and wet with cold water. If an animal is very thirsty, small quantities of fresh water should be given frequently until the thirst is quenched. Except in rare instances, sick animals may be allowed

all the fresh water they want. A little salt sprinkled on the food often proves to be attractive. The feed-boxes, pails and other utensils should be kept clean and free from medicinal odors. As was said at the beginning, the most important thing in nursing sick animals is that the attendant be kind and quiet; that he look carefully after the needs and wants of his patient, and, if reasonable, supply them regularly.

GIVING MEDICINE

In giving medicine to a sick animal the same rules are applicable as in giving it to a human being. Do not give medicine unless upon competent advice, or unless it is given intelligently for a definite purpose. Give no medicines to animals that you would not be willing to take yourself in small amounts. Strong medicines should be diluted until there is no danger of burning the patient's mouth or throat, or of strangling him.

The Drench.—Medicines can be given to a horse in the form of a "drench." The medicines are first dissolved in water or other suitable liquid. The horse's head is drawn up by means of a rope, a loop of which is placed back of the incisor teeth of the upper jaw, the end passed under the nose-band of the halter and then drawn over a beam. With the head in this position, the medicine will not run from the mouth. By means of a taper-necked, strong glass bottle, or a drenching horn, the medicine is poured gradually into the horse's mouth, at the corner.

Fig. 28. Drenching a horse

Fig. 28. In case a horse will not swallow, a teaspoonful of water should be poured into the nostril. This will overcome the difficulty. Drenches or medicines intended to be swallowed should not be given by pouring into the nostril, however. An excellent way

of giving medicine to horses is by means of a small syringe (Fig. 29); the horse's mouth is opened with the left hand, the medicine forced into the back part of the mouth, and the syringe withdrawn. With a little practice, by this method one can give medicine easily and quickly, without loss and without irritation to the animal. In giving drenches to cattle, the animal's head is raised by placing the thumb and first finger of the left hand in the nostrils and lifting the head high enough to keep the medicine from running from the mouth. An assistant, by taking hold of the horns, can steady the animal's head. Fig. 30. In giving medicine to dogs, the mouth can be opened by taking hold of the upper jaw with the left hand and pushing the sides of the lips between the teeth. The medicine should then be quickly poured in well back on the tongue, in order that it may be swallowed at once. Pigs are difficult to drench, but by cutting a hole in the toe of an old shoe, and placing this in the creature's mouth, for him to chew on, the medicine can be poured into the shoe and so it will be swallowed.

Fig. 29. Hard rubber syringe for giving medicine

In giving drenches, great care should be exercised not to strangle the animal, or to get medicine into its lungs. Swallowing is impossible if the head is tipped too high or too far back. Never attempt to give medicine while an animal is struggling violently, squealing, coughing, or emitting other vocal sounds, or when it is only partially conscious, as the medicine is very likely

Fig. 30. Drenching a bull

to "go the wrong way," and, getting into the lungs, to strangle the animal or set up inflammation. Irritating medicines and oils should be given with great caution. When there is doubt as to an animal's ability to swallow, first try him with a little pure water.

Coughing or gagging while being drenched is an indication that the patient is getting some of the medicine into his lungs. Proceedings should be suspended until the animal has recovered.

When medicine for a horse is in the form of a ball or pill, it is held in the tips of the three middle fingers of the right hand, while the operator, standing in front of the horse, grasps the tongue with the left hand and draws it well forward, turning the tip upward toward the roof of the mouth. At the same time the ball in the right hand is inserted and pushed far back over the bulge of the tongue, and both hands are quickly withdrawn from the mouth. With a little practice, balls can be administered readily. In giving pills to dogs, the pill can be placed in a spoon containing milk, water or other liquid, and poured into the back part of the mouth, so that it can be taken at a single swallow.

It is almost impossible to drench a sheep in the standing position without getting some of the fluid into the lungs. The sheep should be set up on its rump and held between the knees, the mouth opened with the thumb and fingers of the left hand, while the medicine is slowly poured into the mouth from the bottle held in the right hand. The neck of the bottle should be inserted in the corner of the mouth, preferably on the right side. This is the only way to prevent choking. Fig. 31.

Hypodermic Medication.— Medicines are frequently administered by injecting them beneath the skin. In this method there is less liability of waste, and the

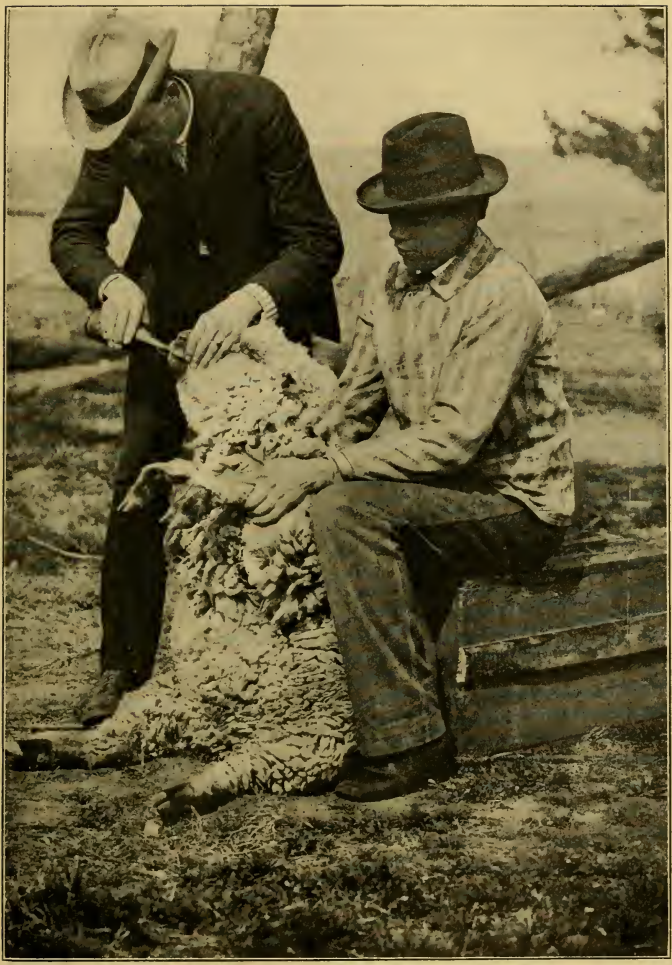

Fig. 31. Drenching a sheep

action of the drug is much more rapid and certain. Much smaller quantities of medicine are required to produce given effects than when given by the mouth. Medicines to be given hypodermically should be sufficiently diluted, so that they will not injure the tissues nor cause severe pain. They must be free from sediment and germs. The hollow needle of the syringe should be unscrewed and taken in the right hand; the skin in the region of the neck or shoulder is firmly grasped with the left, and with the right the needle is quickly pushed through it in a slanting direction. Considerable force is required to push the needle through the skin of the larger and older animals, but the lack of resistance determines when the point is through. The syringe is then screwed on the needle and the medicine gradually injected. The medicine is injected into the loose tissue beneath the skin, usually in the region of the neck or shoulder, to avoid injury to the operator by the animal's kicking or biting. For special purposes, medicines may be injected into almost any part of the body.

In giving medicines hypodermically it is important that the instrument be perfectly clean and that the medicine be pure and well diluted. Under some conditions, medicine may be injected into the trachea, or windpipe, by inserting the needle between the rings of cartilage of which this tube is composed. It should be given in this manner only upon the advice of well-qualified persons. In inserting the needle, care should always be taken not to inject the medicine into veins or arteries, nor to puncture delicate structures.

External Medication.—Medicines are frequently applied by rubbing them on the skin, in the form of lotions, liniments, ointments or salves. Applications are also made in the form of poultices and fomentations. Lotions are medicines in solution, that are useful for their healing, cooling or soothing effects to the part to which they are applied. Liniments are solutions usually containing some irritating substance, such as turpentine or ammonia. They are often mixed with oil, and are applied to a part by rubbing them in. If they are applied too frequently and with considerable friction, they may blister the part, especially if the part is covered by a bandage to prevent evaporation. Liniments should never be applied to fresh wounds nor sores, nor to parts badly inflamed, as they are very likely to increase the irritation of the part and to cause considerable pain. They are useful in chronic cases of inflammation when a mild counter-irritation is desirable. Ointments are medicines mixed with a fatty or waxy substance, and are usually applied externally to soften, soothe and heal inflamed parts. If they contain irritating substances they are usually called blisters. Poultices are soft, moist substances applied to soften and soothe the part and to relax the tissues. They are usually applied as hot as can be comfortably borne and are changed frequently. It is not a good plan to continue the use of poultices very long, as the tissues become soft, flabby and debilitated. Poultices are very useful in severe inflammation to relieve the pain and soothe the part. In old chronic sores they soften the tissue, allay the irritation and hasten recovery. They should seldom be kept

on more than forty-eight hours continuously, and should be changed several times during this period. Poultices are usually made of flaxseed meal, bran, bread and milk, spent hops, mashed boiled turnips, or other clean, soft substances that will retain heat and moisture. They may be applied by binding them on the part directly, or by putting them in a bag of thin cloth. Pulverized charcoal, or a teaspoonful of carbolic acid to a pint of poultice, is excellent to keep the substance clean and "sweet." For fomentations, see page 142.

ENEMAS

Enemas, or clysters, are injections of warm water into the rectum. They may be medicated or not. They are given for the purpose of emptying the bowels and stimulating their movements. In some cases they are also given to remove or destroy worms that may be in the rectum. Six to eight quarts of warm water is usually a sufficient quantity for an adult horse. If the water is slightly soapy, its action is increased; a half-teacupful of pure glycerine added to the water is excellent. Enemas are best given by means of a hose with a smooth nozzle attached to a small force-pump. In the absence of a force-pump, a tin funnel inserted in a small piece of hose about three feet long answers very well; one end of the hose is inserted into the

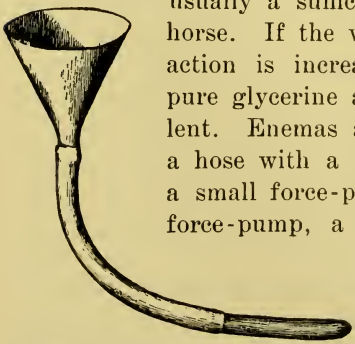

Fig. 32. Apparatus for giving injections

rectum, the other end containing the funnel is held above, and the fluid poured in, the force of gravity carrying it into the bowels. Fig. 32. Enemas should be given slowly, and the animal allowed to retain them for a short time. The nozzle of the hose should be oiled or soaped before it is inserted, so as not to injure the mucous coat of the rectum.

DOSES OF MEDICINE

The amount of medicine given at one time is called a "dose." It may vary, not only with the size, age and temperament of the animal, but also in the different diseases and according to the way in which the medicine is given. In general, a horse will take eight to ten times as much medicine as a man, and cattle take one-third more than horses. Animals of a nervous temperament require less medicine than the slow, easy-going phlegmatic ones. The size of the animal, also, plays an important part in the amount given. Young animals require less medicine than older ones of the same size.

Medicines for animals should be of good quality. In order to get a quick result from them they should be as finely divided as possible, in the form of powders or in solution. If kept any length of time, they should be protected from evaporation by corking or tight boxes. Some medicines lose their strength, while others become stronger. A small cupboard that can be locked is an excellent place in which to keep medicines. All medicines should be plainly labeled.

COUNTER-IRRITANTS

The term counter-irritant is given to a class of medicines that are applied externally for the purpose of setting up a local and artificial inflammation in order to cure a disease or injury. It is a very old treatment and is very frequently used in veterinary practice. Among the counter-irritants that are commonly employed are liniments, hand-rubbing, blisters, seatons or "rowels," and burning with a hot iron or "firing."

Counter-irritants are used especially in chronic or long-continued conditions. They should never be applied to a part when it is acutely inflamed. The inflammation should first be reduced by fomentations of hot or cold water; when the acute inflammation has subsided, if the disease still continues, counter-irritants should be used. A mild form of counter-irritation is hand-rubbing, or hand-rubbing in combination with liniments. The virtues of most liniments are increased by thorough and vigorous rubbing. As soon as the part begins to get sore, or tender, withhold the liniment and rubbing for a few days and then re-apply.

Seatons.—A seaton is a foreign body, usually a piece of string or tape, inserted beneath the skin over the diseased part. It is inserted by means of a seaton needle, and the two ends of the string are tied together to keep it from coming out. The skin below the seaton should be well greased with fresh lard or vaseline, to prevent its being scalded by the pus which is discharged. The seaton should be shifted about every day and washed clean. Sometimes medicinal substances

are applied with a seaton. Seatons are used when a mild, but long-continued counter-irritant is wanted.

Blisters.—The two substances commonly used for blisters are pulverized Spanish flies (Cantharides) and the biniodid of mercury. The former makes what is commonly known as a "fly-blister." The latter, from its color, is commonly called a "red-blister." These blisters are made by thoroughly mixing one part by weight of the drug and eight parts of fresh lard or vaseline. Both of these blisters are poisonous, and should be cared for accordingly. If it is desired to remove bunches, especially bony bunches, the red-blister is commonly preferred; for ordinary purposes, the fly-blister is used. Neither kind should be applied to a raw surface or over a very large area, for it may be absorbed and prove injurious to the animal.

The hair should first be clipped from the area, after which the blister is rubbed in with the fingers from three to ten minutes, depending on how severe an irritation is desired. In most cases, a light blister repeated is more effective and more satisfactory than a single severe one. Horses with thick skin require the blister to be rubbed in longer than thin-skinned, nervous ones. The blister should be left on from twenty-four to thirty-six hours, or until a watery, gummy fluid exudes from the skin and sticks the hair together. Then the area should be thoroughly washed with warm water and soap, wiped dry and greased with fresh lard or vaseline.

If the blister is applied to the hind legs, or to any place which the horse can switch, the tail should be se-

curely tied in a knot. Otherwise, the horse, getting the blister on the tail and then switching other parts, may cause a blister wherever the skin is thin. The horse's head should also be tied so that he is unable to reach the blistered part with his nose, or there will be a larger blister on his nose than on the original part. It is a good plan to tie a horse so short that he cannot lie down while the blister is retained. In the course of three or four weeks the part may be treated again, if necessary, but the second blister should be very light, as the part is tender and the drug acts quickly. When a part is blistered too severely the tissues may be destroyed and slough out, leaving a bad sore and finally a scar; or the roots of the hair may be destroyed, or the hair injured so as to cause it to turn white. The two front or the two hind legs should not be blistered at the same time. In rare cases a blister irritates a horse and causes intense suffering soon after it is put on. It should be washed off at once, the part greased and, if necessary, laudanum given internally. To an adult horse, ounce doses of laudanum can be given every three hours until he is quiet.

Fly-blister applied over a large area sometimes causes severe irritation of the kidneys, with painful passage of the urine. Should such symptons appear, the blister must be washed off at once, the part greased, and the horse given gruels and other mucilaginous drinks, combined with laudanum in half-ounce doses to soothe the irritated parts. When it is necessary to apply an irritant over a large surface,—as in inflammation of the lungs, pleurisy, and some bowel troubles,—

a mustard plaster should be used. Finely ground mustard, stirred up with tepid water into a thin paste, should be applied over the desired area by rubbing it well into the roots of the hair with a case-knife or thin wooden stick. When it is desired to remove the mustard plaster, it should be very carefully scraped off with a curry-comb.

Firing.—"Firing" is burning the skin with a red-hot iron, called a "firing-iron." Fig. 33. The irons can be heated at a forge or at a brisk fire in a cooking stove. Excellent instruments are now in use with the irons kept at white heat by gasolene vapor. Firing is used particularly upon the legs when severe counter-irritation is required, especially in ring-bones, spavins and injured tendons. The hair is clipped from the area. The horse is confined, by taking up the opposite foot so that he is compelled to stand on the one it is desired to fire. A blindfold is placed over the eyes, and a twist is applied to the nose.

Fig. 33.
Firing irons

There are two general methods of firing. One consists in making a series of parallel lines. This is known as "feather-firing" or "line-firing." The second form consists in using a pointed iron and burning a number of points in the skin over the affected area, sometimes puncturing the skin. This method is known as "puncture-firing." Frequently the two methods are combined, and after the feather-firing a few punctures are made over the most-diseased

part. It is thought that puncturing sets up a deeper inflammation.

After the horse is confined, the operator makes a series of parallel lines or punctures about three-fourths of an inch apart over the affected area. In line-firing, the lines usually run obliquely on the legs, so that the marks will not show as plainly after recovery as they would if running vertically or horizontally. At first, the operator barely touches the skin with the firing-iron, marking out his work; later the lines are burned to a good russet brown by drawing the hot firing-iron through the former lines. In feather-firing, the lines should not cut through the skin. After firing, a fly-blister should be rubbed on the fired area, and the case treated as an ordinary case of blistering. After firing, the horse should be given plenty of time for rest and recovery. "Fire, blister and turn out to grass," is a common expression among horsemen.

FOMENTATIONS

Fomentations are applications of hot or cold water to a part. The application is usually from twenty minutes to half an hour. The water may be applied as hot as can be comfortably borne, and the temperature can be kept up by adding hot water frequently. The water can be applied to the part with sponges, cloths, or even with the hands, while, at the same time, the part is gently rubbed. Fomentations should be applied two or three times daily. They are much used to lessen acute inflammation, pain and swelling of

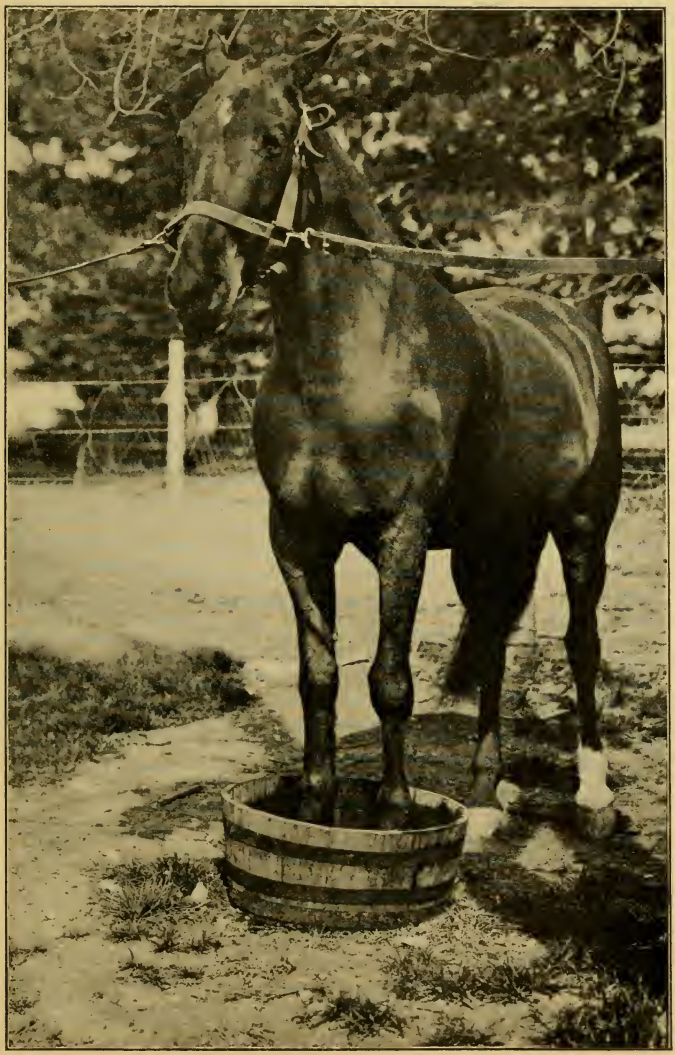

Fig. 34. Horse standing in the soaking-tub

recent injuries, or for any badly irritated part. They are used with good results in inflammation of the udder.

Cold water is also excellent to relieve inflammation, especially when the part is badly congested. It can be applied with cold, wet cloths, or by irrigating the part—that is, allowing cold water to drip upon it. In some cases, applying cold water with considerable force, as a stream from a hose nozzle, for a few moments, and then rubbing briskly, has an excellent effect in toning up debilitated parts and relieving congestion. Cold is often applied to a feverish part by using a bag of cracked ice.

THE SOAKING TUB

A soaking-tub is made by cutting off about one foot from one end of a stout barrel. Fig. 34. This can be placed in the stall and filled with water, either hot or cold. The horse is made to stand in this with his front feet. Soaking-tubs are excellent, especially in cases when the hoofs are dry and hard and there is considerable inflammation of the feet. Twice daily the horse should be allowed to stand in the tub for an hour. The feet should be wiped dry and afterward oiled, or some good hoof dressing applied. Soaking-tubs are excellent if they are used judiciously, but excessive use is injurious.

CONFINING OR RESTRAINING ANIMALS

Animals can be confined in various ways for surgical operations and for other purposes. Horses are put into stocks, or on operating tables built for the pur-

pose. For small operations, one of the best methods of restraining a horse is by means of a "twist." Fig. 35. This is made by tying a loop of small rope, such as sash cord, through a hole in the end of a stick. The loop should be about eight inches long and the stick, according to convenience, from one to five feet long. The long stick allows the person holding the twist to stand far enough from the horse to avoid being struck by the fore feet. The loop of rope should be slipped over the upper lip and the handle twisted until the horse's attention is attracted from the operator and his work. A twist should not be used more frequently, nor tighter, than is necessary; for the horse's lip is very sensitive, and one should always avoid giving unnecessary pain. To prevent injury to the operator or his assistants, it is frequently a good plan to blindfold the horse, by covering the eyes with folds of cloth. This can be fastened to the bridle or to the halter head to keep it in place.

Fig. 35. Twist for confining horses

Another method of confining the horse is by taking up one of his feet and compelling him to stand on three legs. If an assistant holds the foot he should not allow the horse to rest too much weight upon him, for it gives the animal a chance to kick. The best method for a fore leg is to place a loop below the fetlock, bend the leg at the knee and strap the foot to the horse's arm. To take up a hind leg, one end of a long rope is placed below the fetlock, the other end being passed forward and fastened to

the collar about the animal's neck, or held by an assistant.

For an important surgical operation, horses are usually thrown, by the use of either side-lines or hobbles. Fig. 36. The side-line method consists in attaching long ropes below the fetlocks on both hind legs,

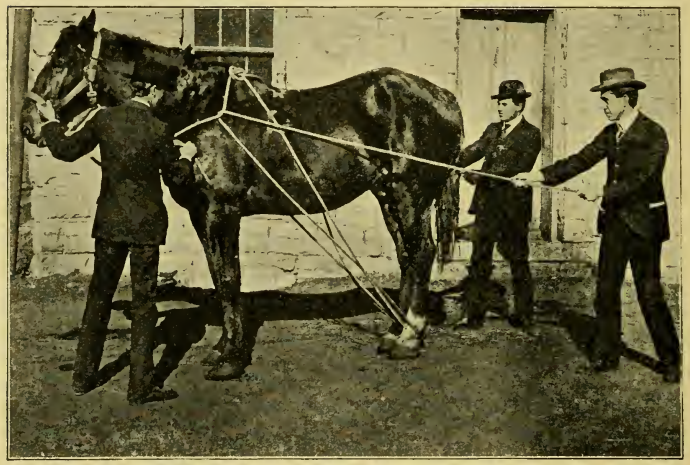

Fig. 36. Throwing a horse by means of side-lines

running the ropes forward to a collar and, by exerting force on the ropes, drawing the animal's hind legs forward and upward and retaining them in that position. Special throwing harnesses are made for this purpose. Lacking these, one may use a piece of three-fourths inch rope forty feet long, doubled at the center and tied to make a loop at that point about two feet long. This loop can be slipped over the horse's head, in the form

of a collar, the knot coming at the top of the neck. The ropes are then brought down one on either side of the horse, each passed under the fetlock joint of a hind leg, and the end run forward through the collar. Assistants, by taking hold of these ropes while the horse is backed, can draw his legs well forward and up on his sides. When the horse is down the feet can be tied in this position with the rope.

The hobble method consists in putting a strap or hobble around each leg just below the fetlock joint. A rope or a chain is then passed through a ring in each hobble and all four feet are drawn together in a bunch, causing the horse to lose his balance and fall. This method should be used on all horses over nine or ten years of age, as by the use of side-lines they are likely to injure their backs by struggling. The backbone of a horse grows stiff with age, and is likely to be broken by bending or severe exertion. The side-line method is excellent for throwing young horses, especially for castrating, as the hind legs are drawn well forward and out of the way.

A third method of throwing the horse, consists in taking up one fore leg, usually the right, or "off" one, by a strap, which is passed either over the animal's back, or under his belly, and held by the operator, who stands by the left ("nigh") fore shoulder. The operator holds up the foot with the right hand, at the same time drawing the horse's head around toward the left and pushing against its left shoulder. This throws the horse on his right side. At once the operator should get on the side of his neck, close to the horse's head.

This keeps him down, for horses get up on their fore legs first, and it is necessary for them to throw their heads upward in order to get their balance.

In throwing horses, a spot of level greensward should be selected, or the floor or ground be well covered with straw, to avoid injury as the animal goes down. It is a good plan to place a folded blanket under the horse's head, to prevent injury to him while down. In working about horses, an operator is liable to be hurt, either by the animal's kicking, biting, or striking with the fore foot. The safest place by a horse when he is standing is close to the left shoulder, as the horse is unable to kick or strike a person there, and the head can be kept away by holding with the right hand. A person should stay close to a horse, or else keep quite out of his reach. A medium distance is dangerous ground.

In throwing good-sized cattle, the animal is confined by the head, one end of a small one-fourth inch thirty-foot rope is tied to the horns, a half-hitch taken about the animal's body just back of the fore legs and another just in front of the hind legs; then, by having the half-hitches tight and pulling on the end of the rope sharply, the animal will go down. Fig. 37. It can be kept down by drawing the tail through between the hind legs and by holding it forward and upward. This keeps the animal from getting up, for cattle always get up on their hind legs first.

Hogs can be restrained by slipping a noose of small rope on the upper jaw just back of the "tusks." This will confine the head, when the animal can be

thrown and the legs tied as the case demands. Dogs should always have their mouths tied tightly shut by using a strip of stout cloth, two inches wide, and tying it about the muzzle; the ends can then be brought around and tied behind the animal's head to keep him from scratching the muzzle off.

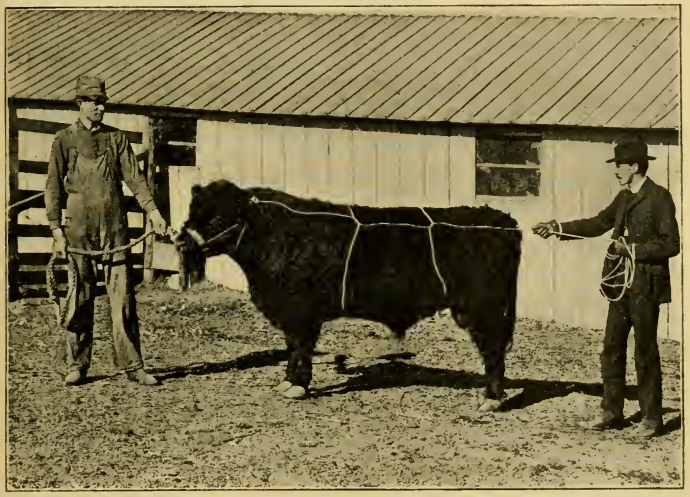

Fig. 37. The half-hitch method of throwing a bull

ANESTHETICS

For all surgical operations when an animal will be subjected to great pain, anesthetics should be used wherever practicable. Horses take chloroform well, but dogs do not and are very likely to die from its effects unless great care is used when it is administered. For

dogs, ether should always be used. In giving anesthetics to animals, a person familiar with their use should be employed. For small surgical operations, a five per cent solution of cocaine, injected by a syringe, destroys all sensation in the part during the operation.

DISINFECTION

Disinfecting consists in destroying the germs or virus of a disease. Whenever an animal has been suffering from a contagious disease, it is necessary to disinfect the quarters and all utensils, instruments, harness and equipment that may have become infected. Stables are disinfected by first removing and burning all litter, rubbish and other loose material of little value. Next, the walls, floors, ceilings, mangers, pails, etc., should be thoroughly scrubbed with a five per cent solution of carbolic acid,—that is, one part of pure carbolic acid to twenty parts of water. When this has dried, the walls and mangers can be painted or whitewashed. Harness and halters can be boiled vigorously for three-quarters of an hour. Corrosive sublimate, or bichlorid of mercury, one part to one thousand parts of water, can be employed in the place of the carbolic acid solution, but should not be used on metal as it is very corroding. One part of creolin or similar coal-tar product to fifty parts of water is also a good disinfectant and is not poisonous. Care should be taken that carbolic acid and corrosive sublimate do not get on any food which the animals may eat. Bright sunlight is an excellent disinfectant,

and should be admitted into all suspicious places. All infected materials, and especially bodies of animals that have died from disease, should either be burned or buried deep to prevent further infection. Dogs, crows and other animals frequently dig up and carry off parts of carcasses. Infectious material is often carried by streams of water, by infected stock-cars, or by litter which may have been in stock-cars.

ANTISEPTICS

Antiseptics, commonly called healing remedies, are substances applied to wounds or sores to assist in the healing process. They are used in solutions, or mixed with some fatty substance, as an ointment, or they may be dusted on in the form of a powder. Antiseptics possess no true healing properties; the healing process can be accomplished only by the living cells of the tissues. They only destroy or prevent the growth of germs. Bacteria, which gain entrance to sores and wounds, by growing and multiplying irritate the wound, injure and destroy the living cells of the animal tissue, and often form poisons that may be taken up by the blood and cause serious injury or death from blood-poisoning. If it were not for bacteria, no wound would be fatal, unless some vital organ were mechanically crippled; all wounds would heal without complications. In ordinary veterinary practice, wounds, abscesses and sores afford ideal conditions for the growth of bacteria, and unless carefully treated are swarming with them. It is to destroy these

germs that hinder the healing process that antiseptics are used.

Practically all antiseptics are poisonous if used in concentrated form, and if applied pure would burn and destroy the tissues; hence, in practice, it is necessary to use them in such a strength that they will destroy the bacteria without injuring the living cells of the body. Antiseptics are usually applied in solution to wounds,—as medicine in this form more certainly penetrates to all parts of the wound; and in deep wounds it is often the only way antiseptics can be applied, and then only by means of a syringe. When antiseptics are used in solutions their strength is easily estimated, and the medicine readily and uniformly distributed. Sometimes antiseptics possess other properties than as germicides.

In addition to the methods of application above described, antiseptics are applied by saturating cotton, gauze or similar material, and placing it either in or on the wound. In general, it is more satisfactory to use weak antiseptics freely and frequently without disturbing the wound. If they do not prove satisfactory, the strength of the antiseptic may be increased.

Corrosive sublimate, or bichlorid of mercury, comes in the form of tablets, with directions for the amount of water in which they are to be dissolved. The greatest objection to it is its corrosive action on metals. It should be kept in glass or earthen vessels. As corrosive sublimate is a powerful poison, it should always be plainly labeled and kept in a place secure from children and others not familiar with its properties and uses. It is ordinarily used in the strength of one part of

bichlorid of mercury, by weight, to one thousand parts of water for external application.

Carbolic acid probably ranks next to bichlorid of mercury in frequency of use as an antiseptic. It is dissolved in water and used in the strength of two and one-half to five per cent; one part of acid to forty parts of water is the strength ordinarily used for the treatment of wounds on animals. For a strong antiseptic or disinfectant, one part of acid is added to twenty parts of water, making a five per cent solution. Pure carbolic acid is a caustic and will destroy tissues by burning. Carbolic acid is poisonous.

Copper sulfate, commonly called bluestone or blue vitriol, is an excellent antiseptic and possesses astringent properties as well,—that is, it tends to pucker the tissues. It can be used in solution, in the strength of from two to four drams in a pint of water. For certain purposes it can be made much stronger. Copper sulfate, finely pulverized and dusted on a wound, is a mild caustic; a crystal of it rubbed on a surface acts as a caustic and is useful to check bleeding. An ointment that is useful in treating old sores can be made by mixing one part of finely pulverized copper sulfate and one part of sulfur with four parts of fresh lard or vaseline. Sulfate of copper is the basic material used in the making of Bordeaux mixture, so much used by farmers as a spraying material.

Zinc sulfate, commonly called white vitriol, is an astringent and antiseptic, and is used in the strength of one part of zinc sulfate in thirty to sixty parts of water, or two to four drams to a pint of water.

Six drams of sulfate of zinc and one ounce of acetate of lead, dissolved in a quart of water, is an excellent antiseptic and astringent, and is extensively used in veterinary practice as "white lotion." It should be well shaken before using. It is poisonous when taken internally. An excellent antiseptic ointment for use on sores or irritated conditions of the skin is made by combining one part of zinc oxid with about five parts of fresh lard or vaseline.

These antiseptics, as already said, possess secondary properties, some are astringent and pucker the tissues, often stopping hemorrhages or drying up discharges. Antiseptics applied in the form of ointments are often used on wounds and sores when the part is hard, dry and irritated; the fat in contact with the antiseptic seems to soften and soothe the part. In the powdered form, dusted over the surface of a wound or sore, antiseptics are valuable in drying up discharges and keeping the sores dry and free from odor.

Antiseptics are sometimes mixed with some sticky substance, such as pitch or tar, and may be valuable in keeping dirt out of a wound; but care must be taken that such applications do not prevent the free escape of pus.

Of the powdered antiseptics, iodiform is extensively used for dusting on wounds or sores; the objections are its odor and expense. Pulverized boric acid is another good antiseptic that is used in this way. It is also used in a solution of twenty grains of acid to one ounce of water, and makes an excellent wash for the eye, for the mouth or other cavities, as it is practically

non-poisonous, Finely pulverized, air-slaked lime is extensively used for dusting on sores, harness-galls and suppurating surfaces, and gives admirable results. Common salt is also used as an antiseptic in the strength of five to ten per cent by weight, dissolved in water. Creolin is a good and popular antiseptic and deodorizer; it is mixed with water combined in the strength of one to two per cent.

Not all antiseptics work equally well on all wounds. Sometimes a certain antiseptic will give excellent results, and on an apparently similar wound does not do as well. In such cases it is well to cease and to try some other. It is better to become familiar with one or two good antiseptics than to dabble with a great variety with which one is not familiar.

CHAPTER VIII

SURGICAL CASES

For convenience to the stockman and horseman, it may be well to bring together in one chapter the various diseases and practices that demand more or less of surgical treatment. These subjects are of three rather distinct categories: mere wounds; diseases and malformations; practices (as caponizing and dehorning) that are dictated by the desire of the owner.

INFLAMMATION

It is first necessary to discuss the general subject of inflammation, since an understanding of it is essential to all good surgical work.

Inflammation is a curative process employed by nature to repair injuries or to overcome disease. It is always the result of irritation of some kind, the bruising of the cells, or the presence of foreign bodies, as germs, or other irritating substances in the living tissues. The process of inflammation is nature's means of fighting the irritant. In many cases, the cause of the inflammation is easily recognizable, in others it is obscure. Inflammation occurs in either an acute or a chronic form. In the former, all the symptoms are well marked; in the latter, the symptoms are not so

prominent, and this form is often more difficult to deal with.

One of the first signs of inflammation is redness of the part. This is particularly noticeable in animals having a white skin. The color is caused by dilation of the blood-vessels, which allows an increased flow of blood to the part. This condition is commonly known as "congestion." Care must be taken not to confound this active congestion with the settling of blood in dependent parts at death (hypostatic congestion). In making examinations after death, one frequently finds the lung on the lower side of the body gorged with blood, a result of gravity. (See page 120). Congestion may occur without inflammation; but congestion always attends acute inflammation as one of its symptoms.

Another symptom of inflammation is increased heat. This can usually be discovered by applying the hand to the part. In case the inflammation is severe or extensive, or affects an important organ of the body, the increased temperature may involve the whole body, causing what is generally known as a "fever." Other symptoms of inflammation are swelling and pain. The pain is usually indicated by the uneasiness of the animal, or by its "resting" or taking all weight and strain from the part. Manipulation may increase the pain to such an extent that its seat is easily and definitely located.

The thing to be done in treating inflammation is to remove the cause or irritant, as soon as this can be determined. In many cases this is all that is necessary. If the inflammation is severe and causes much pain,

applications of hot water often give considerable relief by softening and soothing the tissues. Such applications should be continued for a half hour and applied three or four times daily. Poultices applied to the part are also advisable, but they should not be continued until the part becomes soft and debilitated. Cold water is also excellent to relieve irritation, especially when there is much heat in the part. The cold applications should be continued for a considerable time.

Inflammation may terminate in several ways. It may gradually subside and the part return to its normal condition; two parts may adhere or grow together; pus or "matter" may form, this condition being known as suppuration. Another termination is "mortification," the affected tissues dying and sloughing away, providing the animal lives.

In some diseases, it is frequently necessary, in order to effect a cure, that inflammation be set up artificially. This is usually accomplished by applying some irritant to the surface over the diseased part. Such treatment has been described in an earlier chapter (Chapter VII), and includes burning the part with a hot iron, or "firing," rubbing on some irritating substance in the form of a blister or liniment, or placing a foreign body in the tissues in the form of a seaton.

WOUNDS

Wounds are recent breaks in living tissue and are usually caused by violence, such as kicks, blows, or external contact with foreign bodies. In rare cases

they may be caused by violent internal muscular exertion. They are classified according to their nature. Clean-cut, or incised wounds, are such as would be made with a knife. Other things being equal, incised wounds are the easiest to treat. Lacerated, or torn, wounds are usually made by barbed wire. Contused wounds are those in which the parts are bruised, as well as cut. These wounds are serious, for if the tissues are badly bruised there may be considerable sloughing of the injured parts, leaving a large sore. Punctured wounds are made by more or less pointed bodies penetrating the flesh. Considering their size, punctured wounds are the most serious. They are likely to be deep, and to injure vital parts, or the foreign body that caused the wound is liable to break off and a part of it to be left in the tissues. It is difficult to reach the deeper parts of punctured wounds to clear them of foreign substances and to treat them satisfactorily. Gunshot and poisoned wounds are sometimes classified with punctured wounds, but they are so rare that they do not need special consideration here.

Treatment of Wounds

The first step in the treatment of wounds is to stop hemorrhage, or excessive flow of blood. While a hemorrhage is seldom dangerous unless a large artery or vein is cut, yet it is best to stop it at once. Bleeding from an artery is more serious than from a vein. Arteries carry blood from the heart to the different parts of the body, while veins gather the blood and carry it back to

the heart again. Arteries have thick elastic walls, that throb with the beating of the heart, and the blood is always under considerable pressure. If an artery is cut the blood is bright scarlet in color and flows with force, coming in a full spinning stream. If a vein is cut the blood is dark in color and simply wells out of the wound with no force. In stopping a severe hemorrhage, it is necessary to know whether an artery or a vein is severed. If an artery, the end of the blood-vessel *toward* the heart must be treated, as the blood comes from the heart. If a vein is cut, the end of the blood-vessel *away from* the heart must be treated, as the blood is flowing from the extremity toward the heart. If the hemorrhage is from a large blood-vessel, the best way to stop it is to find the cut end of the vessel and ligate, or tie it. This can be done by getting hold of the cut end with the fingers, pulling the blood-vessel out a little and tying it tightly with silk or linen thread or any other that can be obtained, provided it is clean. The thread should be tied with a "surgeon's knot," as this does not slip. Fig. 38.

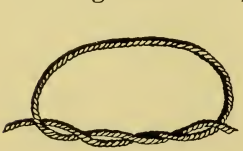

Fig. 38. Surgeon's knot.

Another practicable method of stopping hemorrhage from large blood-vessels is to sear with a hot iron; but this is severe treatment, and should be used only when absolutely necessary. If carefully applied to the blood-vessel itself, however, there is comparatively little pain and the treatment is effective.

For ordinary, and even for severe wounds, nature has an admirable way of stopping hemorrhage. The

blood-vessels contract and the blood collecting in the wound coagulates, forming a clot, which effectually checks the flow. In ordinary wounds the treatment is to hasten the formation of a clot. This can be done by bringing the edges of the wound together and binding them there. Any finely divided substance applied to the wound serves to gather and hold the blood, and so hastens clotting. Absorbent cotton is excellent. Cobwebs should not be used on account of the large amount of dirt and germs which they contain. Finely powdered substances also stop hemorrhage, but they should be clean and not irritating to the wound. Ordinary flour is good. So is a mild astringent solution, as of alum or tincture of chlorid of iron, just enough of the drug being used to make the solution "puckery" to the tongue. Cold water applied to a wound will also check bleeding. The astringent solutions are especially useful when there is oozing of blood from a large surface. After the hemorrhage is checked, the wound should be carefully cleansed and all foreign bodies removed, such as sticks, nails, etc.; the wound will not heal with these present. Extra care in this particular should be exercised in punctured wounds.

Barb-wire cuts occur most frequently about the legs or just above the feet in places where it is often impossible to stitch up the wound. In many instances it is difficult to tie the cut blood-vessels; in such cases, the best treatment is to take clean soft rags, or, better, absorbent cotton, and bind on firmly over the cut; if plenty of material is used a clot will soon form and

the bleeding will be checked. In the course of five or six hours the bandage may be carefully removed, the parts cleansed, antiseptics applied and the torn tissues brought as nearly together as possible by the use of bandages, or sutures. The after-treatment is the same as for an ordinary wound.

The hair about the edge of a wound should be carefully clipped, so that it will not get into the wound and irritate it. After cleansing, apply to the wound some good antiseptic or healing lotion or powder. Among those commonly used are corrosive sublimate, one part dissolved in one thousand parts of water, carbolic acid, one part to thirty parts of water. White lotion is excellent. Among powdered antiseptics, acetanilid finely pulverized, or iodoform dusted on the surface, are excellent.

The next operation is to bring the lips of the wound together and to keep them there. If the wound is large the only practicable way, in treating animals, is to stitch the edges together. For this purpose a surgeon's needle having cutting edges is necessary. Fig. 39. A poor substitute for it can be made by grinding a small darning-needle to a triangular form. It is practically impossible to push the ordinary type of sewing needle through the thick skin of the larger animals. A good-sized, half-curved surgeon's needle, which costs but a few cents, should be kept on every stock farm where a veterinarian is not at hand. For sewing, silk is best. The coarser embroidery silks are good, but braided

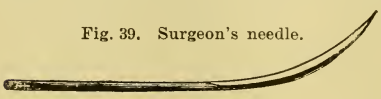

Fig. 39. Surgeon's needle.

silk is better. For some purposes catgut is preferable to silk. Heavy linen thread, doubled, is excellent. In the absence of all these, ordinary cotton wrapping twine can be used, but when there is much strain on the stitches this is likely to part.

Fresh wounds are not sensitive, and can be manipulated without giving pain. In sewing up a wound, the sticking of the needle through the skin often causes some pain, and proper precautions should be taken to confine the animal, so that it cannot injure the operator by kicking or striking, or, in dogs, by biting. Putting a twist on a horse and tying a dog's mouth tightly are usually sufficient precautions.

In sewing up a wound care must be taken to have the parts brought together as nearly true as possible, so that the edges will not pucker. There should be a small opening left at the bottom for drainage, through which the pus, or matter, can escape. The best method for ordinary use is to pass the needle through both edges of the wound, drawing the thread just tight enough to bring the wound nicely together, and then tying with a hard knot. If the stitches are too tight the swelling that usually follows will cause them to tear. In large, deep wounds, the needle should be started well back from the wound and passed deeply through the tissues to hold them firmly together. In cases where there is danger of stitches tearing out from strain on the parts, it can be helped by tying each end of the thread to a round, smooth stick, the size of a pencil or smaller. This method takes the strain off the tissue. Care must be taken, in deep wounds, to prevent sewing

up the skin only, leaving a cavity to gather pus. After the wound is sewed, it should be thoroughly treated with antiseptics, either in solution or as a dry powder, and carefully protected from injury. Animals must be restrained from rubbing or biting an injured part. Antiseptics or healing substances merely destroy or stop the growth of bacteria or germs that interfere with the healing process of nature. If it were not for bacteria, all wounds would heal at once if the parts were brought together. Irritating or caustic substances should never be applied to fresh wounds. Nearly all antiseptics are poisonous, and should be diluted so that they will not injure the living tissues while still destroying the germs. Do not disturb a wound more than is necessary to keep it clean. Cleanliness is the secret of success in treating wounds.

Wounds heal in several ways. One is by "first intention." In this case, the parts brought and held together grow fast without the formation of pus or matter. This is the best method and is always to be desired; but it is difficult to obtain in animals on account of the number of pus-producing bacteria present under ordinary conditions.

The second method is by "granulation." In this, new tissue forms on each side of the wound and gradually fills in and unites the severed parts. When a wound granulates, there is a discharge of pus or matter, and care must be taken that this does not become excessive. Antiseptics should be used freely. In some cases the granulations become too luxuriant and form a slightly fungus-like growth, known as "proud flesh." This

must be destroyed by burning with a stick of lunar caustic.

In another method of healing, the blood and juices collected in the wound form a protective coat, or scab, and healing takes place under this. The scab should never be removed unless pus or matter collects under it.

In cases in which wounds heal by granulation or under a scab, new tissue fills in the gap of the wound and makes the scar, which is likely to remain as a permanent blemish. In wounds which have been sewed up and have done well, the stitches can be cut and removed in about four or five days, providing there is no strain on the tissues to pull them apart. In cases when the stitches become loosened they should be cut and replaced by others that hold firmly, unless the wound has united, when they can be clipped and removed.

It is frequently necessary to make wounds. They should be made quickly, to avoid giving the animal pain, and so far as possible the cut should be made parallel with the muscular fibers of the region. When muscular fibers are cut across, the wound tends to spread apart. Before such work is attempted, the animal should be securely confined, so that it cannot hurt itself or the operator by biting, striking, kicking or struggling.

DISEASES AND ABNORMAL GROWTHS

Under this general head there are grouped, for convenience' sake, diseases and difficulties that are due to many unlike causes. In all of them, however, the

curative treatment requires more or less cutting and removing of tissue.

Abscesses

These are commonly called "gatherings." They are accumulations of pus or "matter" in cavities within the tissues of the body. There are two varieties of abscesses, commonly known as "acute" and "cold." Acute abscesses form rapidly and are accompanied by marked inflammation, with heat, pain, redness and swelling. Cold abscesses are of a chronic nature; they form gradually, without marked symptoms of inflammation, until they are of considerable size. Abscesses are caused by some injury, or by the presence of bacteria, foreign bodies, or irritants within the tissues.

As soon as the symptoms appear, one of two methods should be adopted. (1) In some cases it is a good plan to try to "scatter" the abscess by rubbing and by applying remedies to absorb the fluid or pus. Rubbing with a stimulating liniment, or applying light blisters, is useful. Iodine, either as tincture or ointment, may be applied daily until the skin begins to get sore, and then be stopped for a few days. This treatment is useful in the removal of bunches and enlargements generally, but it should not be applied when there is acute inflammation in the part. (2) The other method, and usually the better one, is to hasten its formation, as an abscess is usually an effort of nature to rid the body of some injurious substance. Bathing the affected part with hot water and applying poultices to soften and soothe the tissues will assist materially in "drawing"

the abscess to a "head." As soon as pus is detected in the tissues (this is indicated by a soft "plunky" feeling when the part is manipulated) the abscess should be opened. For this use a sharp-pointed knife, taking the blade firmly between the thumb and forefinger about the distance from the point that it will be necessary to insert the knife to reach the pus cavity. Insert the knife quickly at the lowest or most dependent part, in order to give free drainage to the pus. In making the incision, do not stand directly in front, as the pus often spurts some distance. The opening should be made large enough to allow the pus to escape freely, and the wound to be washed out and treated. Abscesses should always be thoroughly examined for foreign bodies, such as sticks, pieces of bone, etc., which, if found, should be removed. After emptying the cavity, wash it out thoroughly with warm water and use antiseptics freely. The incision should not be allowed to heal until the cavity has filled up from the bottom, or another abscess is likely to follow. The incision can be kept open by plugging with absorbent cotton or tow. The hair below a wound or an abscess should be kept well greased, in order to prevent the discharges from irritating or scalding the skin.

If an abscess is not opened, it will usually "break" and discharge of its own accord at last; but as the pus burrows into the tissues seeking an outlet, the early opening of the "pocket" greatly hastens ultimate recovery. In opening abscesses care must be taken not to cut by mistake into a hernia, or rupture, or into a joint or cavity containing synovial fluid or "joint

oil." If the abscess is in the vicinity of large blood-vessels or important organs, suitable precautions should be taken to prevent injury to them.

Fistulæ

A fistula is a running sore that sometimes results from a wound or abscess, and does not heal readily, but persists in discharging pus, often for long periods. Sometimes a foreign body in the tissues is the cause of the fistula, or a piece of denuded bone or diseased cartilage. In other cases the fistula is a tube or series of tubes, or a cavity lined with a smooth "false membrane" which must be destroyed before the part will heal.

Poll-evil

This disease, which partakes of the nature of a cold abscess as well as a fistula, occurs in horses on the top of the head or on the neck close to the head. A poll-evil is generally believed to be brought on by an injury, such as hitting the head against the ceiling, pulling on the halter, or by overcheck. In many cases it is difficult to assign the cause, but the disease is probably caused by bacteria invading the tissues of that region.

The first symptom of poll-evil is a rather firm, puffy swelling that occurs on the top, or on one or both sides of the top of the neck. There is usually little pain in the early stages, but later the increased pressure of the pus causes the horse some pain and he

carries his head with the nose protruded to get relief. At first the poll-evil contains a yellowish watery fluid. This fluid, which later becomes pus, often burrows between the muscles of the neck for considerable distances, and, if no opening is made, it may finally break through and discharge some distance from the seat of the trouble.

In the early stages, poll-evil can sometimes be "scattered" by the application of cold water, followed by thorough rubbing with a stimulating liniment, or by applications of iodine, either the tincture or as an ointment. These remedies may be applied until the skin begins to get sore, when they should be withheld for a few days. If the poll-evil is not scattered, it must be opened as soon as pus can be detected. A good-sized incision should be made as low as possible, to give free drainage. The false membrane can be dissected out with the knife or destroyed with a caustic. Chlorid or "butter" of antimony, applied by means of a swab to every portion of the lining membrane of the cavity or the tubes which extend from it, is excellent. Other caustics used for this purpose are a small piece of lunar caustic placed in each cavity or tube, a small lump of blue vitriol, or absorbent cotton wet with a strong solution (one to one hundred) of corrosive sublimate. After using the caustic, the fistula should be washed out once daily and a mild antiseptic used, such as corrosive sublimate (one part to a thousand of water), or one part carbolic acid to thirty parts of water. Showering the parts once daily with cold water from a hose is advisable. Pure tincture of iodine

should be injected into the fistula about once in eight or ten days. Another good method of treatment is to use no water on the fistula after opening, but to swab out with dry absorbent cotton and inject pure tincture of iodine once daily.

Other remedies that are sometimes used with good results are hydrogen peroxid, one part to two parts of water; this is useful for cleansing out all sores. Blue vitriol, or sulfate of copper, a heaping teaspoonful to a pint of water, is a good antiseptic.

Fistulous Withers

This disease, frequently called "thistelow," is practically the same condition as poll-evil, except that it occurs on the withers, or lower and back part of the top of the neck. The causes are believed to be the same,—bruises or injuries, allowing germs to invade the tissues. The treatment is the same except that here it is easier to secure good drainage. If possible, get an opening at the bottom and top or on both sides of the withers or neck. In some cases, when the healing process is slow, a seaton or tape passed through the fistula and left there gives excellent results. The seaton should be shifted to a clean place each day, the wound well washed, and antiseptics used. When the fistula is nearly filled up, the seaton should be removed.

In fistulous withers, the spinous processes of the back-bone may become diseased, and it is necessary to cut them off before the sore will heal. It sometimes requires months to cure a bad case of this disease.

Cancer

True cancers are not common to animals, although malignant sores are sometimes found that do not yield readily to the ordinary methods of treatment. When such sores occur, it is necessary to treat them according to their individual peculiarity as regards form, location and size. If feasible, it is usually the best plan to remove the diseased part by surgical means and to treat the case afterward as a simple wound. When this is not possible, the part may be poulticed for a day or two, then the diseased portion destroyed by means of a caustic, such as chlorid of antimony, applied with a swab, with after-treatment as for a simple wound. It is not a good plan to use strong caustics frequently on wounds, as the caustic destroys the tender healing tissue and often produces a dense, fibrous growth that is extremely difficult to remove or to heal.

Tumors

Tumors are abnormal growths of tissue. There are many kinds, usually named from the kind of tissue of which they are composed, as fibrous and fatty tumors. In white or gray horses there are often found melanotic tumors, composed of coloring matter, usually located in the skin in the region of the neck, urino-genital organs, or tail. Warts are tumors of the skin. Sore tumors, that tend to spread and do not yield to treatment, are known as malignant tumors.

The true cause of the growth of most tumors is not known. Sometimes fibrous tumors are caused by

irritation, such as repeated hitting of a part. Tumors sometimes follow surgical operations or wounds. Horses often have tumors in their noses.

The only satisfactory treatment for tumors is to remove them. There are several methods of doing this; the best one, for most tumors, and the only one for some, is to cut them out with a knife. Care should be taken to guard against hemorrhage, as the blood supply to some tumors is large. Another method that can be used to advantage when the growth has a small base is to tie a strong string — a waxed-end, fish line, or a rubber band wound several times — tightly around this stem, thus shutting off the blood supply. In a few days the tumor will slough off, and the resulting sore should be treated as a simple wound. Another method is to slough them off by using caustics. Arsenic or corrosive sublimate are commonly used, either singly or combined. A pellet of the caustic about the size of a small pea, wrapped in tissue-paper or muslin, is pushed into a small incision made in the base of the tumor. Sometimes two or three pellets are placed in a large one. In a few days the tumor will begin to separate, and will finally slough off. The difficulty in using caustics is to confine their action to the diseased tissue.

Shoe-boil — Capped Elbow

A disease that partakes of the nature both of an abscess and a tumor is a capped elbow, or shoe-boil. It is situated on the elbow, and first appears as a soft,

flabby bag, which contains a little watery fluid. The cause of shoe-boils is irritation due to lying on the shoe, with the foot bent back; hence, as soon as the first signs of it appear, the source of the irritation should be removed. This is not always easy. If the heels of the shoe are long they should be shortened, so that they will not protrude. The horse should be well bedded and a thick protecting pad placed on the pastern of the offending leg. Another excellent method of preventing a horse from lying on the heel of the shoe is to spike a piece of plank two by six inches across the stall, about a foot back of where the front feet usually stand. The corners of the two-by-six should be rounded and the whole well covered with bedding at night. This prevents the horse from doubling the fore foot back on the elbow when lying down, but does not inconvenience the animal.

In the early stages of this disease, fomentations of hot water twice daily followed with a stimulating liniment well rubbed in will often bring relief. If the shoe-boil is large and filled with fluid, it should be opened at the most dependent part, the false membrane lining the cavity destroyed by swabbing the cavity out with butter of antimony, and the wound treated as a fistula.

Another form of capped elbow is a fibrous tumor, which usually occurs where a soft shoe-boil breaks and is neglected, or when the cause of the shoe-boil is not entirely removed. The best treatment is to remove the fibrous bunches with the knife and to treat afterward as a simple wound.

When there is a small flabby bunch on a horse's elbow, removing the fibrous contents will prevent a shoe-boil.

Capped Hock

This disease occurs at the point of the hock and is usually caused either by lying on the hock or by the irritation due to the repeated hitting of a whiffle-tree, chain or other obstacle. The abscess or tumor is usually much smaller than that on a capped elbow. The symptoms and treatment are the same.

Synovial Capped Hock

This condition, showing beneath the tendon that passes over the point of the hock, is practically the same as a wind-puff, and should have similar treatment. (See "Wind-puffs," page 239.)

Open Joint

A wound that is likely to prove serious or fatal is one that opens the tissues over the joint so that the synovial fluid, or joint-oil, will escape. These wounds are generally very small incisions, often resulting from kicks, especially from horses that are sharp shod, from prods with a pitchfork or similar sharp object. They would be insignificant as wounds were not the joint opened.

At first there are few symptoms — a trifling wound from which a small amount of blood escapes. If the wound is examined carefully, a small amount of watery,

sticky fluid may be noticed, that has a slippery feel when rubbed between the fingers. In the course of twenty-four hours, the joint swells and becomes inflamed. The horse is "dead lame," scarcely touching the affected leg to the floor. In some cases there is fever, sweating, loss of appetite and other symptoms of severe pain. The discharge of synovial fluid increases, especially if the animal moves the joint, until a large amount escapes. In most cases the animal holds the leg from the floor, or barely rests the toe. At first the joint-oil that escapes is colorless, but, as the inflammation extends and becomes more severe, the fluid becomes thicker, amber-colored, then reddish, and in severe cases it may contain pus.

The proper treatment is to close the wound and get it to heal as quickly as possible. An open joint should not be probed nor should antiseptics or other fluids be injected into the joint. The wound should be treated as soon as possible after the injury. If it is of some size, it can often be closed with stitches, but care must be taken not to pierce the joint with the needle. After the wound is closed, or at once, if it is small, it can be covered with iodoform, powdered acetanilid, or parched flour, and covered with bandages. If a scab forms that stops the escape of the joint-oil, it should not be removed. To lessen the inflammation, cold applications, such as crushed ice or continuous irrigation by cold water may be employed. The animal should be kept as quiet as possible so as to prevent moving the joint. If the wound heals at once and the inflammation subsides, there is

a good prospect of recovery. If the inflammation is severe and long-continued, the joint is likely to weld together and to become permanently stiff (*anchylosed*). It is sometimes advisable, in severe cases, to kill the animal in the early stages of the trouble, and end the intense suffering that is often associated with the disease.

Capped Knees

This disease usually occurs in cattle that are confined in stanchions, and is caused by irritation of the knees in getting up and down. A baggy tumor forms on the front and lower part of the knee. It is often of large size, but seems to cause little inconvenience to the animal.

In treatment, first remove the cause by confining the animal in some other manner, or by keeping the floor well covered with bedding. The tumor can be reduced in size by hot fomentations and by rubbing with liniment, but to remove it effectively the best way is to open at the bottom and treat the same as a shoe-boil on a horse. In all of these diseases, it must be remembered that the cause must be removed before a cure can be effected, and that the disease is likely to recur if the cause is again encountered.

Wry Tail

The habitual carrying of the tail to one side is a marked blemish in desirable driving horses. The only treatment is to cut the contracted muscles on the side toward which the tail is drawn, and then to carry the

tail to the opposite side and to retain it in that position by tying to a girth until the wound has partially or wholly healed.

Switching the Tail

Some mares of a nervous disposition have a bad habit of switching the tail while being driven, especially when spoken to or touched with the whip. In some cases, breeding the mare and allowing her to raise a colt will correct the habit; in other cases, spaying the mare through the vagina will stop the vice. But in extreme and persistent cases the only treatment is to cut the muscles from both sides of the roots of the tail.

Hernia

A hernia, commonly called a rupture, in most cases is caused by external violence, such as a kick or a blow, that breaks the muscular walls of the abdomen, or belly, and allows some of the contents—usually the omentum, a thin curtain of fat, or a loop of the intestines—to protrude through the opening and press outward against the skin.

There is a rounded, rather firm mass that causes the skin to bulge out as if the part were badly swollen, but there is a well-defined line of separation between the swelling and the other tissues. The hernia is not tender to the touch, and seldom causes the animal any inconvenience. By carefully manipulating the bunch, the protruding mass can gradually be

worked back into the abdominal cavity, only to return again when the pressure is removed.

A strangulated hernia is one in which a loop of the intestine protrudes through the opening and becomes strangled by pressure. It is always a serious condition and demands prompt treatment. The symptoms are those of colic, the animal suffering severe abdominal pain. In treating this trouble, the horse should be kept in such a position that the hernia is on the upper side, so that the force of gravity will pull the intestine back into the cavity. Hot cloths should be applied to the hernia to relax the parts, and then by careful manipulation the intestine may be returned to the abdominal cavity. Afterwards, the intestine may be kept within by means of a truss firmly applied to the spot. But it is a difficult matter to keep a truss in position on an animal. In most of these cases, a surgical operation is necessary to close the opening, whether the trouble be a common omental, or an intestinal hernia. An expert surgeon should be employed to operate.

When a hernia, or rupture, is first formed, the mass should be returned and then a blister applied to the part, together with a temporary truss. The parts will swell and in healing will often close the opening. An ordinary hernia, with no loop of the intestine protruding, can be treated by tying a stout string or rubber band about the hernia and sloughing the part off. This will effect a cure in most cases if properly applied. A hernia may occur on any part of the belly.

Scrotal Hernia

A scrotal hernia is one in which a loop of the intestine descends into the scrotum alongside a testicle. It occurs frequently in foals, usually being present when the colt is foaled. A scrotal hernia can be recognized by the presence of a large, soft mass in the scrotum, that can be pushed up into the abdominal cavity. By pinching the colt's throat, and at the same time watching the hernia, it will be seen to jump up as the colt coughs.

In a majority of cases in little colts no treatment is needed for scrotal hernia, as the animal will outgrow the difficulty. In bad and persistent cases, the hernia should be returned and the colt castrated by the covered operation, described under castration. (Page 186.)

CUSTOMARY SURGICAL PRACTICES

Under this head are included such familiar operations as removing appendages and preventing the breeding of animals. With most of them every progressive farmer is now familiar.

Dehorning

Dehorning consists in the removal of the horns by some surgical method, or by the application to the budding horns of calves of some substance that will prevent their growth. It is better to remove or prevent the growth of horns in calves than to wait until the animals have attained their growth. In domestic

animals, horns are useless and dangerous appendages, and few experienced persons are nowadays willing to have horned animals about them.

The best method of removing the horns is to apply caustic potash to the budding horn as soon as the "button" can be felt beneath the skin on the head of the calf. The hair should be clipped off, the skin over the immature horn wet, and then well rubbed with the stick of caustic potash, the fingers being well protected from it. In applying the caustic, care should be taken to cover the whole "button." After the horn is well started it is difficult to remove with caustic. A small gouge is sometimes used to remove the immature horns.

In removing the horns from mature animals, the animal is confined in a stanchion or chute made for the purpose, a halter is put on the head and the latter pulled well forward and to one side, and firmly held. The horn is then removed, either with a saw or with dehorning shears made for the purpose. In removing the horn a good ring of hair is to be taken off with the base of the horn, or the horn will grow out as a stub. After the horn is removed, some pine tar may be applied and a layer of absorbent cotton placed over the wound to stop the bleeding and keep out the dirt. Cattle should not be dehorned when flies are bad, and, after dehorning, should not be allowed access to straw stacks where they can get chaff into the wounds. Dehorning is not a reprehensible practice, as some persons suppose. The pain of the operation is usually slight. The animal is saved injuries

from fights, and it leads a more contented and peaceful life.

Docking Horses

Docking horses by cutting off the tail, except for disease or to overcome a vice, is a useless and cruel practice, and is not to be recommended. It is now the fashion to dock horses, but such a fashion cannot be permanent.

Docking Lambs

In docking the tails of lambs a strong, sharp knife should be used, and the tail amputated at a joint if possible. To prevent hemorrhage, touching the end of the cut artery with a hot iron or twisting it with a pair of fine forceps will usually stop the flow of blood. The younger lambs are docked the less is the hemorrhage, and the animals do not seem to suffer under the operation as they do when they are older. Lambs are docked to render them cleaner and to prevent the occurrence of filth diseases.

Castrating

Castration consists in the removal or destruction of the essential organs of generation. In the male these organs are the testicles; in the female they are the ovaries. The term castration is properly applied only to the removal of testicles. The operation in the female is commonly called "spaying," and after the operation the animal is said to be "spayed." Animals

are castrated on account of disease, to prevent them from breeding, to make them more tractable, to cause them to fatten more easily; and in some animals to improve the quality of the meat.

In general, the younger the animals when operated the better they withstand the operation. Colts are usually castrated the spring they are two years old, but, if they are not well developed, it is sometimes better to let them go until they are three years old. Calves, lambs and pigs are usually castrated when a few weeks old, or as soon as they are growing nicely. Heifers are spayed as yearlings or two-year-olds; sows and bitches at any age after three months. Females should not be spayed when pregnant, or in heat. Animals should not be operated when sick or debilitated. Operating when the weather is very hot or very cold, or when the flies are bad, should be avoided. The spring of the year, when the weather is cool and pasture good, is an excellent time.

Before operating, the animals should always be examined to determine whether both testicles are "down," that is, in the scrotum, not in the abdominal cavity, and to determine, also, whether there is a hernia or rupture into the scrotum. (Page 179.) Colts with testicles not down are called "ridglings," or "cryptorchids." (Page 186.) Hernias are more likely to be found in colts and pigs.

In castrating, the greatest danger to be guarded against is hemorrhage. In small animals this is inconsiderable; in larger animals measures must be taken to prevent this, as the artery that supplies the testicle is large.

There are two positions in which animals are placed for castration. The standing position can be used for colts or bulls. The colt should be placed with his left side to a wall, and restrained by a twist on his nose. The operator, standing on the right side of the colt, grasps the scrotum above the testicles with the left hand, and with the right makes two incisions into the scrotum, exposing both testicles, which are then drawn down and removed with an emasculator, or "ecraseur." Bulls can be confined in a narrow stall, with a stanchion, the head drawn well to one side and fastened with a halter. The operator grasps the scrotum, reaching between the hind legs with the left hand, and operates as on a colt.

The general method of operating is by confining the animal in a recumbent position. In small animals this is easily done by an assistant holding the animal in his lap, grasping the two right legs in his right hand and the two left in his left hand. Colts are thrown and confined by "side-lines," the legs drawn well forward and high up on the shoulder to prevent struggling. The colt is placed on his left side or back, the operator standing by the right hip. The scrotum should be well washed and antiseptics used. If one testicle is smaller than the other, remove it first; otherwise remove the lower one first. Grasp the scrotum firmly below the testicles, squeezing them against the skin to draw it tight. Make the incision close to the line (raphe) which divides the scrotum in the middle, and well forward; the incision should be large enough to allow the testicle to slip out freely,

and to give free drainage. There are several layers to cut through; when the inner one is cut usually a little fluid (serum) spurts out. The cord should be severed at least four inches from the testicle, to prevent the cord from healing fast in the wound in the scrotum and forming a tumor,—commonly called a "schirrous cord" or "champignon,"—that may attain a large size. The only treatment for such tumor is to remove it the same as a testicle, by surgical means.

There are many ways of severing the cord:

1. By using an ecraseur or an emasculator, instruments designed to crush blood-vessels and prevent hemorrhage. Both of these instruments are very satisfactory.

2. By tying the cord with a small, strong string, and cutting off the testicle with a knife close to the string.

3. By torsion or twisting. A clamp is put on the cord and firmly held, a pair of forceps placed on the cord between the clamp and testicle, about an inch apart, the forceps turned in one direction until the cord is twisted off. The objection to this method is that it is slow.

4. Searing the cord with a hot iron. A clamp is firmly fastened on the cord. The testicle is then severed with a knife and the end of the cord seared with a hot iron. The objection to this is the pain to the animal, and the time required.

The old method of placing wooden clamps on the cord is now discarded by good surgeons, except for the "covered operation" when there is scrotal hernia.

In small animals where hemorrhage is feared, if the cord is scraped or torn apart there is much less danger of bleeding than when the cord is cut with a sharp knife.

After the operation the colt should rest for a time and then have gentle exercise, as this tends to remove blood clots that may collect in the scrotum. If there is much swelling give plenty of exercise, and nitrate of potash (saltpeter) a small tablespoonful to a two-year-old daily for two or three days. If there are symptoms of septicemia, or blood-poisoning, the wounds and scrotum should be thoroughly cleaned out, blood clots and pus removed and antiseptics used freely at least twice daily. Peritonitis, or inflammation of the lining membrane of the abdominal cavity, sometimes follows and is usually fatal. Antiseptics should be used on the wounds, and enemas of warm water and glycerine to empty the bowels. If the animal suffers severely, laudanum in ounce doses may be administered every six hours until the pain is lessened.

In castrating lambs, it is a good plan to cut off the lower end of the scrotum instead of making a separate incision on each side. The testicles are then drawn down and the cord cut off well up. There is very little danger of hemorrhage in castrating young lambs, and the cord can usually be torn, scraped or cut off.

The same method is sometimes used in castrating calves. In castrating bulls the end of the scrotum is frequently cut off, but the cord should be separated with the ecraseur, emasculator, or scraped off, as there is often considerable hemorrhage.

A ridgling or cryptorchid is a colt or horse in which one of the testicles remains in the abdominal cavity, and does not descend into the scrotum at birth, as is usually the case. In a few cases the missing testicle can be felt in the inguinal canal, leading from the abdominal cavity to the scrotum, where it can be secured and removed in the ordinary way, but in most cases the testicle is in the abdominal cavity and an expert surgeon should be called upon to operate for its removal. A ridgling has all the characteristics of a stallion, and after the testicle that is down is removed, can serve and impregnate mares, although the service is not as sure as that of a perfect stallion. In rare cases both testicles remain in the abdominal cavity.

Scrotal hernia is most frequently met with in colts and pigs. In operating, an incision is made through the skin, but not through the thin, white membrane that covers the testicle. The hernia is then reduced by working the intestine back into the abdominal cavity, and a clamp is firmly fastened on the sack above the testicles and they are removed. The clamps are left on until the sack is grown together above; this holds the hernia in place. In operating on colts or horses, a skilled surgeon should be employed. While scrotal hernias are rather common in young colts, most of the animals outgrow the difficulty before they are two years old. In operating on pigs, the hernia is pushed back into the cavity, the testicle removed and the sack firmly sewed up by sewing "over and over," or the sack is gathered together and firmly tied with a stout string.

The secret of success in castration is to have the instruments and the parts clean, to use antiseptics freely, to operate quickly, to make the incisions of good size, close to the middle line of the scrotum (raphe) and well forward, to take the testicle off well up, and to give plenty of exercise after the operation.

Caponizing

Castrating fowls is called "caponizing," and the castrated animal is called a "capon." The operation is performed to prevent breeding, to make them grow faster, and to cause them to fatten more easily. Capons weigh, on an average, one-third more than cocks of the same age, and the meat is of much better quality.

The best time to caponize cockerels is at six weeks old. They should fast twenty-four hours before the operation. A tilting table, about the height of a barrel, is excellent, but a barrel can be used. The light must be very good. The cockerel is stretched out and confined by loops of cloth to which weights are attached. One loop is placed about the wings and another about the legs. The operation is best performed on the left side. At six weeks old, it is not necessary to pluck the feathers. On older animals, however, a few feathers must be removed from the point of operation. An incision about an inch long is made between, and parallel with, the last two ribs. The incision should be made at one stroke through the skin and muscles. The peritoneum, or lining membrane, is then torn through and the intestines

pushed down out of the way. The left testicle is situated in front of the kidney and behind the lung. It is best removed with an ecraseur, made by doubling an "E" violin string and pushing the loop through a small tube. This loop is slipped over the testicle and tightly drawn, thus cutting off the testicle. Both testicles can be removed through one incision, but many operators think they can save time and that the fowls do better when operated on from both sides. The incision should be sewed up by taking two or three stitches. Following the operation, feed the birds lightly with soft, laxative food. Barred Plymouth Rocks make very fine capons.

The loss from the operation is very small when properly performed, and few "slips," in which both testicles have not been removed, will occur. An amateur, before attempting to operate, should practice upon a dead cockerel until he is familiar with the anatomy of the parts. The best plan is to take instruction from an expert caponizer.

Spaying

There are three general methods of spaying. First.— Through the vagina. This method is applicable only to large animals, as cows and mares, where the vagina is large enough to receive the hand. The animal is confined in a standing position, The left hand is inserted in the vagina, or uterus. An incision is then made in the upper front part of the wall of the vagina, just in front of the uterus. The left hand

is inserted through the incision, the ovaries are found on either side of the uterus and removed with an ecraseur or emasculator, made for the purpose. This is an excellent method when it can be used.

Second.—The flank method. This is used mostly for heifers and sows, though some surgeons also use it for bitches. Heifers are confined in the standing position, in stanchions, and crowded against a wall on the left side; the hair is clipped from a space about six inches long and two inches wide, between the point of the hip and last rib, antiseptics used, and an incision four or five inches long made through the skin and muscles. Some operators prefer the left side, but the rumen, or "paunch," is somewhat in the way. The left hand, previously cleaned and oiled, is inserted, the ovaries found lying on either side of the uterus or womb, and removed with an emasculator or spaying shears. The wound is closed with two strong stitches, antiseptics being used. Both ovaries are removed through one incision.

A sow is laid on a table, the mouth firmly tied with a strip of strong cloth to prevent biting. The incision can be made on either side. The tube connecting the ovary with the uterus is found and followed to the ovary, which can be removed by tearing off with the thumb and finger; the other ovary is removed in like manner through the same incision.

Third.—Through the belly. This is used mostly on bitches. It is also used on sows and heifers, but is not so good as the flank method, on account of the danger of a rupture following, and because of the

difficulty of making the stitches hold. The bitch is confined by tying the mouth tightly with a strip of cloth or string, and an anesthetic may be given. Ether should be used, as chloroform, unless carefully given, may be fatal to dogs. The bitch is placed on her back on a table and held by two assistants, one taking the fore and the other taking the hind legs. The hair is clipped off, antiseptics used, and an incision about two inches long made through the skin and muscles on the median line about the center of the belly. After cutting through the muscles, a thin, tough membrane (the peritoneum) is found, which can be cut slightly with a knife and then torn with the fingers, so that there will be no danger of cutting the intestines. The right index finger is inserted into the abdominal cavity and the fallopian tubes found which lead from the uterus to the ovaries. The tubes run well forward. Care must be taken not to break them, as it is extremely difficult to find an ovary when it is not attached to its tube. The ovary is carefully torn from the fibrous tissue that holds it in place, then it is torn from the tube by the thumb nail. The other ovary is removed in the same way.

There is no need to remove the uterus or tubes unless the animal is pregnant. In normal cases it is not necessary to ligate anything. After removing the ovaries, the tubes and intestines that may have escaped are replaced in the cavity and two stitches taken through the skin and muscles to close the wound. Following the operation, the dog should be left to herself. Often there is nausea and vomiting following

the operation, but this soon passes away, though the animal may not take food normally for twenty-four or thirty-six hours. In about four days, the stitches may be clipped and removed.

In all animals the ovaries can be distinguished by the firm, dense structure, which, if once felt, is easily recognized. The ovaries are ovoid in form and vary in size from a large hickory-nut, in cows and mares, to the size of a pea in small dogs or cats. After cows or sows are spayed they should not be turned with males till the wounds have healed. They should be watched to see that flies do not attack the wound and deposit eggs, which develop into loathsome "maggots." To prevent attacks by flies, tar daubed over the wound is excellent.

CHAPTER IX

BREEDING AND VETERINARY OBSTETRICS

VETERINARY obstetrics deals with the care of domestic animals during pregnancy, the birth of their young, and the after-treatment. There is probably no phase of veterinary practice that is so little understood by stockmen generally, nor one in which a little knowledge and practice are productive of such good results. In cases of difficult labor, ignorance and bad practice are very likely to bring about injury to both dam and offspring.

The generative organs of the female consist of the external part called the vulva; from this a tube lined with mucous membrane, called the vagina, leads into the interior of the body. At the farther end of the vagina there is a constriction, and in the center of this a small opening passes into the uterus, or womb. At the farther extremity of the womb two tubes, called fallopian tubes, branch off, one to the right and the other to the left. At the end of each fallopian tube is a small round body called the ovary, which contains the ova, or egg-cells. From time to time, after the animal is full grown, a mature egg-cell passes from the ovary into the fallopian tube; if not impregnated, by coming in contact with a male cell, it passes out through the uterus and vagina with the mucus that is secreted from their lining mem-

brane, and dies. Opening into the vagina at its lower surface, close to the vulva, is a small tube, the urethra, which connects with the bladder, and through which the urine is discharged. This is mentioned particularly because, in passing probes or other small instruments into the vagina, they should be directed toward the upper part of the vagina, to avoid passing them through the urethra into the bladder.

When an ovum, or egg, is discharged from an ovary into the fallopian tube, it is attended by certain symptoms of nervous or sexual excitement, and an abnormal discharge of mucus from the vagina. To this period, the term "heat" or "rutting" is commonly applied by stockmen. During this period, the female is desirous of sexual intercourse. If intercourse takes place and conditions are favorable, the ovum or egg is fertilized by the male cell and, instead of passing out and dying, remains in the uterus, to the wall of which it becomes attached. It develops into a young animal of the same species, except when animals of different species are crossed, in which rare instances a hybrid is the result, as, for example, the mule. The period of heat varies in different animals, about as follows:

Mare	Once in three weeks
Cow	Once in three weeks
Ewe	Once in sixteen days
Sow	Once in three weeks
Bitch	Once in six months

These dates refer to the average time that elapses from one period of heat to another, providing pregnancy does not occur.

During the period of heat, the milk secretion, if the animal is giving milk, is usually lessened. Sexual excitement is exhibited by the female jumping upon other animals, and appearing more or less nervous and excited. The mucous discharges from the vagina seem to have an odor that is attractive to males and causes sexual excitement in them.

STERILITY

Sterility, or impotence, is inability of an animal to reproduce its kind. In common language, such an animal is "a non-breeder." In the male, impotence is usually due to an absence of the spermatozoa, or male cells. This condition may be associated with advancing age or excessive service; in some cases it is a congenital defect,—that is, a defect peculiar to the individual. In those males in which the impotence is due to debility, rest and nourishing food combined with good tonic medicines, especially those which contain nux vomica, comprise the best treatment. There is no specific medicine for the treatment for this condition, and all hope of recovery is to be based on strengthening and toning up the whole system. In other cases, impotence in the male may result from some malformation or disease of the genital organs. A thorough and careful examination should be made in order to discover the cause. When there is doubt as to the cause of impotence, the male may be allowed sexual intercourse and some of the spermatic fluid collected and examined under a compound microscope. If

spermatozoa are present, they will be observed as small swimming tadpole-like organisms. Should the spermatozoa be absent, or should the fresh specimens be inactive, the trouble is clearly located in the spermatic fluid, which is formed in the testicle. It is very rare for males ever to recover their fertility if the spermatozoa are not found in the spermatic fluid. Sometimes, however, this absence is due to some temporary disorder, which can be removed. Abnormal growths and diseases of the genital system in the male must be dealt with according to circumstances. In such cases it is frequently an economical plan to castrate the animal and fatten him for the market.

Sterility in the female may be due to an absence, or to an abnormal condition, of the ovum, or egg, which develops in the ovary and is discharged into the uterus or womb periodically at the time of "heat." These conditions are not frequent, however, as those animals which come in heat regularly and with the normal symptoms are usually fertile, so far as the egg is concerned. It is difficult to determine when sterility is due to an absence, or to sterility, of the egg-cell.

Another cause of sterility in the female is an altered secretion of the mucous membrane which lines the genital organs. If this secretion be acid in reaction, it is fatal to the male cells, or spermatozoa. The mucous membrane may be diseased, and this condition may cause sterility. In some animals, especially cows, there is often observed a disease, known as *nymphomania*,

which is an abnormal sexual excitement. The animal being in heat very frequently, or continuously, will take service by a bull, but will rarely become pregnant. Unless the cause of the sexual excitement can be located and removed (which is seldom), the best treatment is to spay the animal and fatten her for the market.

Nervous, vicious animals are not so likely to breed as those of a milder temperament. Aged animals, especially mares, that have not been bred for some time, are extremely difficult to impregnate. This is well illustrated by the difficulty experienced in breeding mares that have been used for racing until they are ten or twelve years old, and are then retired for breeding purposes. A large percentage of them fail to become pregnant. Mares that have been bred frequently often will continue to breed after they are twenty years of age. Fat animals are seldom good breeders, and it is often difficult to impregnate them. Animals intended for breeding should be in very moderate flesh. Active exercise, just before the animal is fed, is conducive to fertilization.

In the large animals, such as the mare and the cow, it is usually an excellent plan, when there is difficulty in getting them to breed, to "open the womb." This is done by inserting the oiled hand and arm into the vagina, finding the opening into the womb, and gradually dilating it by inserting one or more fingers, until the passage is considerably enlarged. A sponge tent can also be inserted, which absorbs moisture, swells, and automatically dilates the passage. In some

cases it may be necessary to make a small incision in order to dilate the opening. It is probable that mechanical manipulation of the parts, aside from the mere dilation of the passage, is conducive to fertilization, by increasing the blood supply to the part. There are some mechanical contrivances, now on the market, which are useful in dilating the mouth of the womb, and increasing the probability of pregnancy, especially in mares.

Females that have aborted are not so likely to breed, especially when the abortion has been due to contagion. Tumors, malformations, or diseased conditions of the genital organs in females, are frequent causes of sterility. In mares that have been bred, there is sometimes an opening from the vagina into the rectum, through which pieces of dung often pass and escape from the vulva. This opening usually results from injury to the part while foaling. Such mares do not breed readily and are liable to injury in foaling afterward. In many cases this opening between the rectum and the vagina can be closed by a good surgeon and the mare become as valuable as ever for breeding purposes. Excessive sexual intercourse in all animals tends to lessen the fertility of the animal.

Breeding very young animals is likely to stunt the growth of females and to impair the vigor of the reproductive system in males. Stallions should not be used for breeding purposes until three years old, and should be limited to fifteen or twenty mares the first season, and not used very frequently even then.

Bulls may be used for breeding at two years old, but should be limited to fifteen or twenty cows. A judicious use of young breeding males will greatly prolong their vigor and fertility.

SIGNS OF PREGNANCY

It is often important to determine whether a female is pregnant, as the value of the animal may be enhanced or lessened by such a condition. In its early stages, pregnancy is difficult to recognize. One of the first signs is the absence of the usual period of heat, or rutting, although in some cases a pregnant animal will take service by the male. Service is usually resented by the female. There is a tendency for the animal to be more quiet than usual, and to take on fat more readily. This fact is sometimes taken advantage of by unscrupulous persons who breed animals, when beginning to fatten them for the market. In some cases, a pregnant female becomes more cross toward other animals and will drive them away. As pregnancy advances, the belly becomes more pendulous and movements of the fetus (the young animal in the womb) become apparent, especially after the animal has taken a drink of cold water. These are peculiar jerking or kicking movements, and are observed in the region of the dam's flank, particularly on the right side. They can often be felt by placing the hand firmly against the flank. In cows, as pregnancy advances, there is often a small rope of mucus, called by cattlemen a "tag," hanging from the vulva. In large ani-

mals, as cows and mares, pregnancy can sometimes be detected by a physical examination. The rectum is emptied, two assistants pass a folded blanket under the animal's belly and lift up, while the operator, his hand and arm oiled and inserted into the rectum, feels for the uterus, which lies just beneath the rectum. When the uterus is found, a quick push downward is given with the flat hand, and the hand held quietly in position. If the animal is pregnant, the small fetus will be felt as it bobs back against the hand, like a cork floating in water. The pregnant uterus felt in this manner is much larger than the normal uterus, and it lies about half an arm's length from the vulva. Sometimes animals, particularly mares, show few if any signs of pregnancy until they surprise their owners with their living young.

Pregnant animals should be kept in fair flesh, not very fat nor very thin. They should have plenty of exercise, and laxative, but not too bulky food. Harsh treatment, excitement and violent exercise should be avoided, such as fast driving, heavy pulling, wallowing in snow-drifts or mire, slipping on ice, crowding through narrow doorways, kicks, blows or sudden jumps from the use of the whip. During the later stages of pregnancy, strong medicines, especially violent purgatives, should not be given.

The period of gestation, or pregnancy,—that is, the time which elapses between the fertilization of the egg and the birth of the young,—varies in different animals as follows:

Mare	about 344 days, or eleven months
Cow	about 280 days, or nine months
Ewe	about 152 days, or five months
Sow	about 112 days, or three and a half months
Bitch	about 63 days, or two months

Pregnant animals frequently give birth to their young sooner than the period indicated. If the young animal is sufficiently developed to live, it is usually called a premature birth ; if the fetus is not sufficiently developed to live, it is called an abortion. Pregnant animals may also carry their young longer than the period indicated.

SIGNS OF PARTURITION, OR APPROACHING BIRTH

At the close of the period of gestation, signs of approaching parturition usually appear. The mammary glands become distended, the vulva enlarges, and the mucous membranes lining the vagina become congested and red. In cows, the hip bones tip forward a little, and a small depression on each side of the root of the tail appears more marked. The cow is commonly said to be "down in her hips." In mares, a waxy secretion often appears on the ends of the teats. There is a tendency for the animal to isolate herself from others, and to hide away. As parturition approaches she becomes somewhat nervous, stepping about uneasily, the uneasiness increasing until labor-pains set in.

Parturition is the birth, or expulsion, of the young from the womb. The mouth of the womb dilates, the vagina and vulva enlarge, the membranes that surround

the fetus in the womb, commonly called the "water bags," pass out through the vagina, followed by the young animal; and, last of all, the remaining membrane, or "after-birth," is expelled.

Animals about to give birth to young should be placed in dry, comfortable quarters, with a moderate quantity of fine litter for bedding. If too much bedding is supplied the animal may paw it into a bunch and in lying down or rolling, as it frequently does, may become "cast,"—that is, get into a position from which it is unable to rise without assistance. Or, if the young are small, the mother may lie upon them or injure them if they are covered by much bedding. Sows, in farrowing, often lie upon the pigs and kill or injure them, especially when the pigs are crowded against a wall. To prevent this, a piece of plank two inches high may be spiked to the floor, two or three inches from the wall; or short pieces of board about a foot long may be nailed to the floor and wall, the bottom of the board being placed three or four inches from the wall. These pieces should be nailed about eighteen inches apart. After the animal is made comfortable in quarters where she is not liable to injure either herself or her young, she should be undisturbed, but a close watch should be kept to see that labor is proceeding normally, and that everything is going as it should.

Labor-pains are muscular efforts of the mother to expel the fetus. The muscular walls of the uterus, or womb, contract at the time the animal strains, and thus the fetus is gradually forced out through the vagina. At first the labor-pains are slight and infre-

quent, but, as parturition progresses, they become frequent and more violent.

The normal position for young animals to be born is with the front feet and head foremost. This is the best and easiest position, as the head and fore legs act as a wedge and gradually dilate the passage. Young animals are frequently born with the hind legs foremost. No attempt should be made to turn them, as they are usually born without much difficulty, and seldom need assistance in this position. It is better that labor should proceed slowly, in order that the passages may gradually dilate and adjust themselves to the fetus and thus avoid injuring the soft tissues.

DYSTOKIA

Dystokia, or difficult labor, a condition in which assistance is needed in order to deliver the young animal, is rather frequent. It may be due to an abnormal position of the fetus, a very large fetus, a small passage in the dam, or to some malformation, either of the fetus or of the dam. When an animal has been in labor for an hour or two, when the labor-pains are strong and frequent and no progress is made in the birth of the young, the probability is that something is wrong, and attention to the case is demanded. The chances of success are much greater when the case is taken early, before the mother is exhausted from severe straining, and before the water bags are ruptured and the lubricating fluids allowed to escape and the parts to become dry and swollen.

Difficult labor is more easily treated in cows than in mares, and the results are better. In treating dystokia, the animal, if large, should be kept in the standing position, if possible, as it is easier to handle and better results follow. In many cases the animal will not stand. The operator should be clad in sleeveless clothing that will not be injured by being soiled. The arms should be rubbed with carbolized oil, one part of carbolic acid to thirty parts of oil; lacking this, any clean oil will do, or soap and water may be used. The first thing to be determined is the position of the fetus, called the "presentation." The case may be a normal presentation, a hind-leg presentation, etc. After determining this point, the fetus should be gotten into the normal presentation, if possible. If this is not feasible, a hind-leg presentation should be secured. Failing in both of these, it is usually necessary to resort to embryotomy, that is, to cut the fetus up and take it away in pieces. It is impossible to turn a fetus of any reasonable size end for end in the uterus. One of the most frequent abnormal positions is with the head and fore leg presented and one fore leg doubled back. In this case, double a piece of rope and loop it around the fore leg, and another around the head; then push the fetus back into the uterus, and bring forward the fore leg that is doubled back, thus securing a normal position. In most cases of dystokia, smooth pieces of small rope, six to eight feet long, are all that is needed. Cotton sash cord is excellent.

When both fore legs are doubled back and the head

is presented, the latter should be secured by a rope, the fetus pushed back, and the legs secured and brought forward. In case the fetus is dead, and the head is badly swollen, so that it cannot be pushed back, the head can be amputated after the neck is firmly secured by a rope. When the fetus is presented with the hind parts first, both hind legs are to be secured and the delivery made in that position. When both hind legs are doubled back it is called a "breech" presentation; this, and a back presentation are usually very difficult to deliver. A fetus may be presented in a score of different positions, some of them requiring ingenuity and skill to handle, together with careful study of conditions.

Fig. 40. Loop for removing small animals.

In small animals, when the vagina is too small to admit the hand, a piece of wire can be doubled and the ends passed through a small tube, thus forming a loop (Fig. 40). This can be slipped over a leg or the head of the fetus, the tube pushed up to hold it, and the fetus secured. Excellent forceps are made for this purpose. In case the fetus is deformed or is a monstrosity, it should be dealt with as the special case seems to warrant.

When the head is greatly distended with "water on the brain" (Fig. 41), a small incision through the top of the head will allow the fluid to escape, and the delivery will be easily accomplished.

When the fetus cannot be secured in any other manner, it is necessary to perform embryotomy. Special knives made for this purpose are a great advantage,

but a common pocket-knife can be used, by winding the lower half of the blade with a string; the point of the blade can be used for cutting, and when inserting the knife into the womb the blade can be protected by the hand, so that it will not injure the mother. Embryotomy is a hard, and often a difficult task to perform, but in many cases it is the only hope of saving the dam. In treating cases of difficult labor, the following directions should be observed: Be sure to get the fetus in a good position, either with the head and fore legs in the passage, or the hind legs, before attempting to use force in taking it away. After getting the fetus straight, use gentle traction, pulling in a downward direction. The amount of force that one person can exert is usually sufficient; in some cases more may be employed, but the practice of tearing the fetus away is cruel and should not be allowed. Avoid injuring the mother by bruising, tearing or cutting the tissues, as inflammation and blood-poisoning may follow. Sometimes the dam continues to strain after the young animal is born; a small rope tied tightly around the body, just in front of the hind legs, will usually stop this. In mares, the foal is sometimes too weak to

Fig. 41. Head of foal with "water on the brain."

rupture the membranes in which it may be enveloped when it is born; thus it is likely to suffocate if an attendant is not at hand.

The young animal should be made comfortable and left with the mother, unless there is danger of its being injured. Sows sometimes eat their young pigs. In such cases the pigs should be taken away for a short time, and the sow well fed. The pigs, before returning to the mother, may be rubbed with some disagreeable substance, such as a weak solution of aloes; sometimes a piece of raw onion rubbed over the little pigs will answer the same purpose. When there is an abnormal discharge from the vagina following parturition, the uterus should be washed out with warm water, and a weak solution of carbolic acid, one part carbolic acid to forty parts of water, or a solution of creolin, one part to one hundred parts of water. This may be used daily.

REMOVING THE PLACENTA

In nearly all animals, with the exception of the cow, the placenta, or after-birth, comes away when the young animal is born. In the cow, it frequently remains attached to the walls of the uterus. When it is not removed, it decomposes and is discharged as a yellow or reddish fluid, having an extremely offensive odor. The discharge is most apparent when the cow is lying down or when she endeavors to pass urine. The tail and parts about the vulva are soiled by the fluid, which often contains lumps of

decomposing material. The cow falls away in flesh, the milk flow is lessened and the animal presents a general unthrifty appearance. The placenta should not be left longer than the third day. To remove it, the cow should be confined by the head and an assistant should hold the tail to one side. It is a good plan to wind the free portion of the placenta upon a small stick, and roll the stick up until it reaches the vulva. The right hand and arm of the operator, well covered with carbolized oil, should be inserted into the uterus, following the placenta (which is easily distinguished from the surrounding tissues) by rolling the stick which is held in the left hand. The attachments of the placenta to the walls of the uterus can be worked loose with the fingers of the right hand and the whole membrane removed.

EVERSION OF THE UTERUS

This condition is commonly called "casting the weathers," and is most frequently seen in the cow. It occurs after calving, especially when there has been difficult labor and much irritation of the part. After the calf is born the cow continues to strain until the uterus is forced out and hangs in a large mass from the vulva.

The displaced uterus should be carefully washed with warm water, containing a small amount of carbolic acid or other antiseptic, and then carefully pushed back into place. The animal will strain while this is being done, but it is to be firmly held until the straining is

over. In replacing an everted uterus, the closed fist should be placed beneath the mass, and gradually pushed up into the vagina. This returns the parts to their normal positions.

Taking about four stitches through the lips of the vulva will hold the uterus in place. The stitches can be left for twenty-four to thirty-six hours, or until all straining is stopped. In some cases a truss, made of rope, can be arranged so that it will cover the vagina; it is held in place by tying to a band around the body. A pessary is also used,—a small smooth stick, such as the end of a fork handle, is cut off about three feet long, and a hole is bored through the cut end. After the uterus is replaced, the smooth end is inserted and the stick is held in place by a small rope passed through the hole in the end and tied to the band around the body. A small rope tied tightly around the body just back of the front legs, and another just forward of the hind legs, usually will keep the cow from straining.

A cow that has everted the uterus once is likely to do so the next time she calves. In purchasing cows, the vulva should be examined to see whether there are scars of stitches where it has been sewed up. When there is a tendency toward eversion, there is likely to be protrusion of the vagina previous to calving. A reddish mass is noticed to protrude when the cow is lying down. To remedy this condition, the vagina should be replaced and the hind quarters of the cow elevated by raising the rear of the stall, say, five or six inches.

ALTERED MILK SECRETION

After an animal has given birth to young, if there is a scant secretion of milk she should be given plenty of watery food, especially bran mashes, as these tend to increase the milk flow and they have a laxative effect on the bowels. When the udder is swollen or inflamed, soft watery foods should not be given.

The milk may be abnormal or altered in any one of several particulars. In some cases there is little or no fat in the milk. This may be habitual to the animal or it may be caused by improper food, especially by foods which are poor in nourishing materials, such as bad hay or corn-stalks, and such foods as swill or refuse of any kind. In treating this condition, a careful examination should be made for disease of any kind that would interfere with the health of the animal; the food supplied should be rich and easily digested. If the condition is natural to the cow, it is a good plan to fatten her for the market.

Bloody milk is frequently seen, especially soon after calving. This is the result of a rupture of some of the small blood-vessels that surround the secreting cells, or it may be due to a local injury or to a diseased condition of the udder, such as might result from a tumor or tuberculosis in this gland. In the treatment, conditions responsible for the disease should be looked for, and, if possible, removed. Bathing the udder with hot water and milking frequently give good results.

Blue, bitter, "slippery" or putrid milk, is caused by the presence of germs which have gained entrance to

the udder. The disease can be treated by milking the gland clean frequently and injecting a solution of boric acid, about ten grains to the ounce of water. The solution can be injected by using a milking tube — a rubber tube and funnel. This solution can be used twice daily, after milking.

Bad odors in milk often come from strong or bad odors about the stable. The source of the taint should be removed and the milk well aerated.

MAMMITIS

Mammitis is inflammation of the mammary gland or udder. It is called "caked bag" and "garget." The term garget is usually applied to those cases in which the milk secretion is altered and appears as a thick or stringy fluid.

Inflammation of the mammary gland usually occurs soon after the young is born, when the gland is active and congested with blood. Inflammation may be set up by irritation of any kind,—injuries, such as kicks or blows, or another animal stepping on the udder, the retention of milk too long without being drawn, and especially by germs entering the udder.

In many cases of mammitis the gland is hard, swollen and tender, often "pitting" on pressure; the milk secretion is altered, often thick or stringy, or sometimes is only a watery fluid. In most cases the flow is greatly lessened. As the disease is most frequently seen in cows, the description will be applied to them. The cow is often uneasy with the pain. In severe cases the milk

secretion is stopped in one quarter or in all of the udder. In very bad cases a part of the udder may die and slough off. In cases in which the secretion is stopped it may return at the next period of lactation.

In treatment, the milk should be drawn frequently and the udder gently but thoroughly rubbed. Bathe with hot water for twenty minutes at a time, rub dry, and apply an ointment made by dissolving two tablespoonfuls of gum camphor in a teacupful of melted fresh lard. An ounce of fluid extract of belladonna added is an improvement. The gland should be bathed three times daily, and the ointment well rubbed in. If the udder is large and pendulous, supporting it with a wide piece of cloth with holes cut for the teats, gives relief. A poultice of spent hops or similar light material applied inside of the cloth is excellent.

A form of inflammation of the udder that is prevalent in some localities starts with a small sore at the opening of the milk-duct. This causes the cow to milk hard, and a milking tube is resorted to, which usually carries the germs from the sore up into the udder and causes much difficulty. When these small scabby sores first appear they should be treated with white lotion, and lard or vaseline applied to keep the part soft. As there is a tendency for the opening to close and heal over, a small, smooth, hard-wood plug should be inserted in the end of the milk-duct after each milking. The plug should be well greased with vaseline or fresh lard.

In cases in which mammitis is due to invasion of the gland by bacteria, a solution of carbolic acid, one

part to fifty parts of boiled water, should be injected into the udder through the milk-duct with the apparatus used for the treatment of milk fever. After the solution has acted for a few minutes, it should be milked out. The external treatment for such a case is the same as directed for an ordinary case.

Milking tubes are valuable instruments when used with care and good judgment, but their indiscriminate use is often the source of much harm. Before using them, both the tubes and the teats should be carefully disinfected.

MILK FEVER

The term "milk fever" is not the correct name to apply to this disease, as there is rarely any fever associated with it; in fact, the temperature is usually below normal. "Parturient apoplexy" is a much more appropriate term; but the name commonly used to designate this disease will be used here.

Milk fever attacks dairy cows soon after calving, usually within a few days after, but always within ten days. The best and heaviest milkers are most subject to the disease. In most cases the cow is down, or partially unconscious, with the disease when first noticed. If the attack is gradual, the first symptom is uneasiness,—the cow is dull, the appetite gone, and the milk secretion lessened or stopped. If the cow is forced to walk there is a peculiar paddling gait, and a vacant stare from the eyes. These symptoms increase until the cow, unable to stand, falls or lies

down. The nose is usually turned toward the flank. In severe cases the cow is totally unconscious, and in most cases is only partially conscious. Often there is a slight moan with the breathing, due to the stupor. There may be some excitement in the early stages of the disease.

The cow should be made as comfortable as possible and kept propped up on her brisket, with the head elevated. If she can swallow, a small dose of three-fourths of a pound of Epsom salts should be given as a drench. Great care must be taken to prevent choking, as she is often unable to swallow properly, and medicine getting into the lungs is liable to choke her to death or to set up pneumonia that will prove fatal. The most satisfactory method is the Schmidt treatment. This consists in injecting into the udder a solution of three drams of iodide of potash dissolved in one quart of clean boiled water. The milk is first stripped from the udder and the solution injected by means of a small rubber tube about three feet long, in one end of which is inserted a milking tube, and in the other a small funnel. Fig. 42. The milking tube is inserted into the milk-duct, the funnel held as high as the tube will allow, and the solution poured in. As much of the solution as possible is injected into each quarter by working and manipulating the udder. In many cases it is impossible to get more than a pint into the udder at once. If no

Fig. 42. Schmidt apparatus.

marked improvement sets in, the injection may be repeated once after eight or ten hours. It is a good plan to dash cold water over the cow, wetting her to the skin, and have two persons rub her vigorously for twenty minutes till she is thoroughly dry, and then blanket her warmly. Cloths wet with cold water or a bag filled with crushed ice should be applied to the head. An enema of warm water to empty the bowels is excellent. If the cow can swallow without danger, stimulants can be given. Essence of Jamaica ginger, in two-ounce doses, may be given every two hours, or whisky in four-ounce doses. Both should be diluted in a pint of rather hot water. It is a good plan to milk the cow frequently, and to bathe the udder with hot water, rubbing it well. If the cow can eat, soft mashes, gruels, or other laxative, easily digested foods, can be given. Cool water can be offered frequently and in small amounts until her thirst is satisfied.

The iodide of potash, or Schmidt treatment, has reduced the rate of mortality in this disease nearly one-half. It is difficult to tell by the symptoms whether a cow is going to recover or not. Cows having the disease in apparently the worst form often make surprising recoveries, and mild cases sometimes die without any apparent reason.

It sometimes occurs that a cow recovers from milk fever but dies from pneumonia, caused by food or medicine getting into the lungs. It is probable that most cases will do better when no attempt is made to give medicines by the mouth.

CARING FOR THE YOUNG, AND WEANING

Young animals should always be allowed to have the first milk, or colostrum, as this has a laxative effect upon the bowels and assists in the removal of the waste material which has collected before birth. When this is wanting, a dose of castor-oil in warm milk should be given. When it is necessary to wean young animals, they should be placed in secure quarters where there is no danger of injury, and far enough away from the dam so that their cries may not be heard. They should be taught to eat food before weaning. This can be done in most cases by placing the feed-trough or box low enough so that they may eat with the mother. It is seldom advisable to feed a large number of young animals in common, as the stronger tend to gorge themselves and to prevent the weaker from getting food. After weaning, young animals should be fed frequently, a small amount of food being given at a time. Colts are usually weaned at from five to six months old. Calves are usually taken from the cows two or three days after calving,—as soon as the milk becomes normal. Pigs are weaned at about two months old, and lambs at three to four months. After weaning, the udder of the dam should be milked often enough to relieve the pressure and to prevent inflammation. When it is desired to "dry off" the dam, the udder should not be milked dry.

The greatest objection to patent feeding devices in which milk is used as food for young animals is the difficulty in keeping them clean and sweet. In weaning

calves it is generally preferable to teach them to drink "by hand."

PYEMIA, OR BLOOD-POISONING, IN COLTS

Pyemia is a disease of young colts due to infection by pus-producing bacteria. The disease usually occurs within two or three weeks after the colt is foaled. In the early stages of the disease the symptoms are the collecting of pus in the pockets or swellings, and usually some swelling of the joints in the affected region, with stiffness and difficult locomotion. If the pockets are not opened, the pus often burrows along the tendons and in the loose tissue about the joints, until it finally breaks and discharges as a thin yellow fluid from pockets that spread and ramify in various directions. The source of infection is usually a wound of some kind, in some cases probably the navel. When this disease is neglected the colt becomes dull, loses appetite, lies in the sun, grows weak, and finally dies.

All cavities containing pus should be opened freely, washed out with warm water, and treated with a solution of corrosive sublimate (one part to one thousand parts of water). A solution of one part of peroxid of hydrogen in two parts of water is excellent. A solution of white lotion, made by diluting the ordinary solution with one-third the amount of water, can be used in place of the sublimate. An infected navel must be treated with strong antiseptics, a weak tincture of iodine, or cauterized with lunar caustic. The colt should be well nourished.

CHAPTER X

DISEASES AND INJURIES OF THE BONES, LIMBS AND JOINTS

BONES are composed of both mineral and organic matter. In early life there is a predominance of the animal or organic matter. As age advances the relative proportion of mineral to animal material becomes larger, the bones become harder and more brittle, and, as a result, are more easily broken, and when broken they do not unite as readily as do the bones of young animals. This is an important fact in determining whether or not it will pay to try to repair broken bones in animals.

FRACTURES

A fracture is a break in a bone. It is usually produced by external violence, although, in rare cases, a fracture may be caused by severe muscular exertion. As a general rule, fractures are not frequent among animals. There are cases, however, in which the bones are abnormally brittle and break easily. The bones of young animals, being somewhat flexible, will sometimes double up or bend out of place without cracking when subjected to a severe strain. Such a condition is commonly known as a "green-stick fracture," but it is not frequently seen. When a bone is broken into

two distinct parts it is called a "simple fracture." If one of the pieces of broken bone should penetrate the flesh and skin so as to protrude it is called a "compound fracture." If the bone is broken into three or more parts it is called a "comminuted fracture." Fractures are usually serious, but their importance also depends upon the location,—whether near a joint or so covered with tissues as to be inaccessible to treatment. The severity of the break, whether other tissues are injured, the age, value, and size of the animal, as well as the work for which the animal is intended, are to be considered in the treatment. Fractures usually do better, and there are greater probabilities of recovery, in small animals than in large, because the former are more easily treated and controlled. As a general rule, fractures in cattle make better recoveries than those in horses, other things being equal.

One of the most positive symptoms of fracture is the loss of use of the part, especially when the part is a limb. The animal is unable to use it to any extent and, if forced to move, goes on three legs. There is usually a displacement of the broken bone,— that is, the bones slip by each other and can be moved out of their normal positions. In most cases there appears to be an extra joint where the break occurs, and the part can be moved in various directions or swings about in a useless manner as the animal moves. Another important indication is a grating sound, called "crepitus," which can be heard or, better, felt, when the broken pieces of bone are moved upon each other. In some fractures there is no displacement of the broken pieces,

especially in small, short bones ; but, by grasping the two extremities and moving or twisting them, the crepitus, as the broken parts grate over each other, is distinctly felt or heard. Pain is usually a well-marked accompaniment of fracture. Any movement of the part irritates the animal. Swelling usually follows in a short time, in the region of the broken part, especially if the bone be covered by soft tissues.

The treatment of fracture consists in replacing the broken bones in their normal positions and keeping them there without movement until they have knit or grown fast together. This is a more difficult matter in animals than in the human subject, owing to the difficulty in controlling the movements of the animal. It is seldom worth while to attempt to treat severe comminuted fractures, when the bone is crushed into pieces. If the ends of the broken bones have slipped by each other, it is necessary to pull them apart until the broken ends can be brought squarely together. Dogs should always be muzzled, to prevent their biting the operator. It is often a good plan to give the small animals ether, as it not only does away with the pain but renders the muscles limp, so that the part may be easily set; and it keeps the animal quiet during the operation. After the bones are placed in position, the part should be covered with two layers of flannel bandage, smoothly applied. This is to allow for swelling of the part and to prevent the splints from injuring the skin. Over the flannel bandage splints can be applied. These are thin strips of wood, or other light, stiff material, that can be shaped to the part, placed

on the outside of the flannel bandage, and firmly held in position by binding them on with bandages. The splints should be as long as possible, in order to give greater leverage both above and below the fracture, and so to prevent the part from moving. It is sometimes a good plan to allow the splints to extend from the foot to the knee or hock joint, or, at least, the full length of the broken bone and as much farther as possible. When the broken bone is in the leg, where there is very little soft tissue covering it and consequently very little swelling, a plaster of Paris splint, or cast, can be applied directly over the flannel bandage. Prepared plaster of Paris bandages can be purchased at drug-stores, or they can be made by using strips of cheese-cloth or thin cotton two and a half inches wide and six feet long. These bandages are liberally sprinkled with plaster of Paris, which is worked into the meshes of the cloth and sprinkled on its surface. The bandage is then rolled up. When ready to apply, the bandages are placed in a vessel of water until thoroughly saturated, as shown by the absence of escaping bubbles. The bandage is then applied firmly over the fracture, beginning below and winding upward until a jacket is formed at least half an inch thick. The plaster cast should extend as far above and below the fracture as is possible. It is a good plan to start the plaster of Paris bandage at the foot or at a large joint, in order to prevent its slipping down, as it is likely to do if the swelling in the part should subside. Splints are also made of leather, tin and stiff felt; and, in some cases, a thin strip of iron can be bent

to conform to the leg, and either be bound on with bandages or welded to the shoe, the upper end being held in position with bandages. After splints are applied to a fracture, they should be carefully watched, to see that they do not "cord" the part, shutting off the circulation below. Chafing of the part or loosening of the splints is to be guarded against. Should these conditions occur, the splint or cast should be removed and another applied. After the splints are applied the animal must be kept as quiet as possible. If it is a horse, and kept in the standing position, slings or "lean-tos" should be supplied, to rest the animal. If the animal is lying down it should be well protected by bedding, to prevent the forming of bed-sores. Plenty of nutritious, laxative food, especially bran for the larger animals and milk and meat for the smaller, should be supplied, as these furnish an abundance of the mineral substances which are important in preventing disease and in repairing injuries of bone.

A jelly-like substance exudes from the broken ends of bone. This soon turns into gristle and forms a callus around the broken parts, and finally turns into bone and firmly welds the parts together, if they are brought into contact. If the bone has been well set in its normal position, the callus becomes absorbed and disappears, and scarcely a trace remains to show the place of the fracture. Sometimes, in setting a fracture, the bones are not replaced in their normal position, and, as a result, the leg may be shortened or somewhat crooked, causing the animal to limp.

The animal, may suffer no pain, however, and little inconvenience from this. It is surprising to see how quickly animals suffering from fracture will learn to protect the injured part, and will get up and lie down with little difficulty, or will hobble about at pasture. Horses recovering from fractures should not be put to work for three months.

When a bone has not been set and the part has been subject to movement, the ends of the broken bones sometimes heal over, and the condition known as "false joint" occurs. The animal is usually severely lame and of little use when afflicted in this way, as it is practically incurable. If possible, the animal should be fattened for slaughter.

Broken bones in the legs of chickens can be set by incasing the bone in a splint made by using narrow strips of cotton cloth covered with glue, applied as a plaster-cast is to a larger animal.

When a fracture occurs close to a joint the inflammation may extend to the joint, and, in the healing process, the bones of the joint become firmly welded together, or "anchylosed."

The bones most commonly broken in animals are those of the legs, jaws, face and hips. It is impossible to put splints on broken thigh bones of large animals, because the bone is so deeply covered with muscle. It is usually a waste of time and a source of expense to try to treat a fracture that has "gathered" and is discharging pus. This condition generally indicates that there are some loose pieces of bone that must be removed.

FRACTURE OF HIP BONE

The condition that causes a horse to be "hipped" is due to a fracture of the crest of the ilium, at the point of the hip. The large muscles attached to the bone draw the broken piece downward. It usually results from striking the point of the hip against a door-post or similar obstacle, and, in some cases, from kicks by other animals. It is also seen in cows, but not so frequently. No treatment can be applied. The animal generally recovers, but the point of the hip does not return to its normal condition, and the affected hip is noticeably lower than the other. This condition rarely causes any inconvenience to the animal, and is only noticeable as a blemish.

ULCERATION OF BONE

When a bone has been injured so as to destroy the tough, fibrous membrane (periosteum) that covers the outside, the bone may ulcerate and a running sore form, which discharges a thin, watery pus. This condition can usually be recognized by passing a small metal probe into the wound, when the hard denuded bone can be distinctly felt. This condition usually requires a surgical operation, cutting down upon the injured bone, scraping away the diseased part, removing any lumps or splinters of bone that may be found, bringing the parts together and treating it as a simple wound. A solution of one part of peroxid of hydrogen to two or three parts of water injected into such a

sore oxidizes the dead tissue, destroys the pus and cleans up the bone nicely, without injuring or irritating the living tissues. When injected, this medicine should cause the sore to foam like soda-water if pus is present.

"SIDE-BONES"

On either side of the foot of the horse, at the top of the hoof and close to the heel, can be felt a piece of cartilage. These are the "lateral cartilages." These allow the fatty frog and soft tissues of the heel to expand as the horse brings his weight on his foot. In heavy draft horses especially, there is a tendency for these cartilages to turn to bone, causing a condition known as "side-bones." These side-bones can be felt as a hard piece of bone in the place of the cartilages, and can not be bent with the fingers. In heavy draft horses or those not used for driving on the road, side-bones are of little importance, as they seldom interfere with the animal in any way. In horses intended for driving, side-bones may cause lameness, and such animals are considered unsound. The only treatment for this condition is to have the side-bones removed by a surgical operation.

SOFTENING OF BONES

In animals, especially when young, there frequently occurs a softening of the bone, which allows them to bend and become deformed. This deformity may also occur in young animals when the body is unusually heavy, and they attempt to walk before the legs are

strong enough to sustain the weight well. The condition is most frequently observed in heavy-bodied puppies. The treatment for softening of the bone is to give liberally of foods containing mineral matter, such as meats, a little ground "green" bone, bran and lime-water. Milk is also excellent. Especial attention should be given to keeping up the general health of the animal.

BRITTLE BONES

Bones naturally grow more brittle with advancing age, but abnormal brittleness may occur in young animals,—due to an abnormal amount of mineral matter. The causes of this condition are not understood, but it is generally believed to be due to some defect in nutrition. Medicinal treatment does not seem to be of benefit. The diet should be carefully looked after, the bowels kept open, and the general health promoted by a variety of food, fresh air, sufficient exercise and sunlight.

CARTILAGE TURNING TO BONE

As animals grow old and the bone becomes brittle, there is a tendency for the cartilage or "gristle" of the body to ossify, or turn into bone. This condition sometimes occurs in young animals. There is little help for it; the only treatment is to look carefully after the animal's diet, and supply food and water that contain little salts of lime. Rain-water is usually preferable to well- or spring-water for this purpose. Bran and animal foods should be avoided as much as possible.

OSTEOPOROSIS

This is a disease of horses, and is commonly known as "big head." In some regions it is rather prevalent, while in other regions it is rarely seen. This fact is explained by the presence or absence in the soil, water or food of some substance which is important in the growth and nutrition of bone. The disease is probably associated with the salts of lime.

Osteoporosis is an absorption and softening of the bony structure. The bone becomes increased in size, but lighter in weight, and very porous or spongy. The disease is usually first observed in the bones of the head. The bones of the face become enlarged, giving the face a full, rounded appearance. The lower jaw-bones become enlarged; later, the legs are affected. The bones may be slightly inflamed, somewhat tender upon manipulation, and locomotion may be interfered with. As the disease progresses, the animal falls away rapidly in flesh.

The treatment for this trouble consists in the use of tonic medicines, combined with a variety of nourishing foods, and hygienic surroundings. Once the disease is well established, treatment is of little avail.

BONY ENLARGEMENTS

Bony bunches, or enlargements, are technically known as "exostoses." They may occur at any point on a bone, but are most frequently found and are most serious in the region of a joint. An exotosis, "or bony bunch," is

usually a result of inflammation of the part, which, in turn, is an effort of nature to overcome an injury or a disease. In many cases, after the disease or injury is cured, the bunch is absorbed and the part returns to its normal size. The absorption of bony bunches can frequently be assisted by the application of light blisters to the parts. When a bony bunch occurs at a joint and welds the bones together, the joint is said to be "anchylosed," (page 222) and remains permanently stiff.

BONE SPAVIN

A bone spavin is an inflammation of some of the bones forming the hock-joint of the horse, usually followed by a bunch or exostosis, which causes anchylosis, or welding together of the bones of the joint. Bone spavins occur on the inside of the joint, slightly to the front. There are two kinds, commonly recognized according to their location, the high spavin, and the low or "jack" spavin. The high spavin is usually the more serious, as the joint affected is more important and more motion takes place there.

The causes of bone spavin may be divided into (1) the predisposing, which includes a bad conformation or a hereditary tendency, and (2) the exciting, such as strains or injuries which are direct causes Horses with rough, coarse hocks or with hock-joints that are either too straight or too bent or crooked, are liable to spavin. There is also an hereditary tendency often transmitted from the sire or dam to the offspring. There is a frequently expressed opinion among farmers

that a ring-boned or spavined mare "will do to raise colts from," but she is very likely to transmit a similar tendency to her colts. Horses suffering from ring-bones or spavins should not be bred, unless these diseases were evidently of accidental origin or the animal is particularly valuable for breeding purposes.

One of the exciting causes of spavins is hard or fast work, especially in young horses. Most cases of spavin occur in horses under eight years of age. Spavins may be caused by strains, blows and injuries to the joint, especially the concussion or jar that comes from fast driving on hard roads. Another cause is allowing the hoof to wear unevenly, so that too great a strain is brought on the hock-joint, especially on the inside. The feet of colts should be examined frequently before they are shod, and any inequalities removed, so that the foot shall be kept level.

There is a lameness that is very characteristic of spavin, but it is difficult to describe. The horse has a peculiar, "spavined" gait,—a slight hitch in the affected leg and a sudden dropping on the well one as he travels. The lameness is most pronounced when the horse first starts out. After going some distance, the lameness may largely disappear, and the horse is said to "warm out" of it. In traveling, the horse steps on the toe of the affected foot, usually wearing away the toe of the hoof or shoe very rapidly. If a spavined horse is driven rapidly until thoroughly warm, when cooled he is unusually stiff and lame in the spavined leg. If the hock-joint of the affected leg is flexed to its utmost, by carrying the foot forward and

as high as possible, then held in this position for a few minutes, and then the horse is started at once into a sharp trot, the lameness will be found to be more severe.

A careful examination of the inside of the hock-joint, either by feeling or comparing it with the other joint, will show an enlargement, or bunch, that may vary in size, according to circumstances. The size of the bunch does not indicate the severity of the disease. The most severe cases of spavin (occult) may occur without any bunch or enlargement. When standing, the horse usually rests the spavined leg by carrying the foot slightly forward and bending the hock-joint a little. Figs. 43, 44.

Fig. 43. Bone-spavin, shown at the arrow.

In treating spavins, the object is to hasten the welding together of the joints. In order to do this, all movement in the joint is to be stopped as far as possible. If the joint is badly inflamed, reduce the inflammation by fomentations of hot water, applied two or three times daily for twenty minutes at a time. A high-heeled shoe should be applied, to prevent straining the joint. The heel of the shoe should be

raised about an inch, the inside calk being lower, in order to throw most of the weight on the outside of the joint. After the acute inflammation has subsided, a sharp blister should be applied, covering an area of at least three inches in diameter over the spavin A "red blister" is usually preferred. The blister may cause the exostosis to increase in size for a time, but this is not to be feared. The blister may be repeated in three or four weeks. After the blister has been applied, a run at pasture is excellent, the high-heel shoe being left on. In bad cases, it is often a good plan to "fire" the spavin at once. In firing a spavin, the usual plan is to "feather" or "line" fire clear around the joint; then to put a few punctures in the region of the bunch, care being taken not to open the joint. The essentials to success, in treating spavins, are counter-irritation and rest. A cured spavin is one in which the inflamed joint is firmly welded together by the bony bunch or exostosis, so there is no motion in the joint. This stops all irritation, and, as a result, the horse goes without limping. A spavined horse is always unsound, and an expert can detect such an animal, even though a "cured" one, by seeing the animal move. Spavins are more successfully treated in young animals than in old. In some cases, spavins resist all forms of treatment and the horse remains

Fig. 44. Bone-spavin, as shown on bones of the hock-joint.

seriously and permanently lame. In a majority of cases, spavins can be treated successfully, the lameness will disappear, and the horse can perform ordinary labor with little, if any, inconvenience.

Occult spavins, when there is no visible bony bunch, are difficult to remedy. After the joint is well knit together and the lameness disappears, the exostosis, or bunch, will usually be absorbed and disappear. A light blister, rubbed on occasionally, will assist in removing it.

Bog-spavin is a very different disease and is separately treated near the end of this Chapter (page 238).

Fig. 45. Ring-bone on bones of the pastern-joint.

RING-BONE

This name is applied to the same condition as a spavin, except that it occurs on the pastern-joint, rarely the coffin-joint, on any one of the four legs. There is inflammation of the joint, followed by exostosis, and usually by anchylosis, or welding together of the large and small pastern-bones. In many cases there is no "ring" of bone around the joint, only a bony bunch at one or on both sides of the joint. Figs. 45 and 46. The predisposing causes of ring-bone are long, oblique or very short straight pasterns. There may be, also, an hereditary tendency to the disease. The exciting causes are practically the same as those of spavins,—sprains, injuries and concussion. Ring-bone

is sometimes caused by a sharp-shod horse stepping on its mate so as to injure the joint.

The symptoms of ring-bone are severe lameness, with inflammation of the joint as shown by heat, pain and swelling. These symptoms are followed by a bony bunch, thrown out usually toward the side of the joint; or the exostosis may form a ring nearly around the joint.

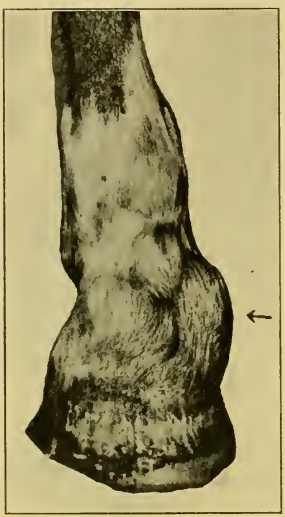

Fig. 46.
Ring-bone enlargement.

The treatment for ring-bone is the same as that for spavin, except that firing is to be resorted to earlier. Ring-bones occur on a much more important joint than the spavins. More motion takes place at the pastern-joint, and as a result ring-bones are more difficult to cure. The treatment, as commonly expressed by horsemen, is to "fire, blister and turn out to grass." When the joint is welded together, the ring-bone is said to be cured. A horse having a ring-bone, even though he is cured, has a decided limp, owing to the welding together of the bones of such an important joint. Such animals are useful only for performing slow work.

BIG-KNEE AND OTHER ENLARGEMENTS

Big-knee in horses is comparable with ring-bone or spavin, except that it occurs at the knee-joint. There is inflammation, followed by a bony bunch, or exostosis, and often by anchylosis. Firing, a blister and rest comprise the best treatment. Horses affected in this way are of little value.

Inflammation followed by exostosis and anchylosis may occur at almost any joint in the body. The symptoms and treatment are practically the same as for ring-bone, spavins and big-knee.

SPLINT

A "splint" is an exostosis occurring on the inside of the fore leg below the knee, between the splint-bone and the cannon-bone. It rarely occurs on the outside, or on the hind leg, and such cases are probably due to an injury. Splints are rather common in young horses, especially colts, but unless they are close to the knee so that inflammation is liable to extend to the knee-joint, they are usually of little importance, except for the blemish that the bunch causes. In some cases there may be persistent lameness associated with the splint. Such animals are considered to be unsound.

The splint-bone on the inside of the fore leg is a small bone attached to the side of the cannon-bone by means of ligaments. On the top of this splint-bone rests one of the bones of the knee. Any severe

strain or concussion has a tendency to split the splint-bone loose from the cannon-bone. To stop any movement that may take place between these two bones, nature throws out an exostosis to weld them together. When this is accomplished, the bones are held firmly in their normal position and the splint is cured.

When splints are first forming there is usually lameness, though not always. The first symptom usually noticed is the appearance of the small bunch on the inside of the fore leg.

Unless there is a marked lameness or the splint is large, the best treatment for this trouble is to let it alone or to hand-rub thoroughly. The lameness usually disappears, and the bunch becomes absorbed. When there is marked lameness or a large bunch, a light blister rubbed over the part and repeated in three or four weeks is usually sufficient. Tincture of iodine, painted on once daily until the skin becomes sore, and then withheld a few days, is good. When there is much inflammation or a large bunch, puncturing the periosteum, or covering of the bone, with a fine-pointed knife will often relieve the pressure and stop the lameness. This operation should be performed by a skilled surgeon.

DISLOCATION OF BONES

Dislocated bones are commonly said to be "out-of-joint." This condition is comparatively rare in the lower animals. Dislocations are caused by violence, severe strains, peculiar attitudes and slipping, which produce a partial or complete rupture of the strong ligaments

which bind the bones together at a joint. Partial dislocation of joints are more frequent, especially so in young "loose-jointed" colts.

Knuckling

A partial dislocation occurring at the fetlock-joint in colts is commonly called "knuckling." It may be so severe that the colt is unable to walk to any extent. It is most frequently seen in suckling colts. If taken in time, and properly treated, it will usually be outgrown. If the colt is small, putting on splints of wood, leather or similar material, first protecting the leg by a flannel bandage, will usually strengthen the part, and prevent the joint from doubling over and becoming sore from striking the ground. Foals will outgrow and make good recoveries from bad cases of knuckling. In older horses the tendency to double over at the fetlock-joints can usually be corrected by shoeing in such manner as to throw the fetlock-joint backward. Aged horses, or horses that have been subjected to severe exertions from fast driving, may knuckle over at the fetlock-joints, particularly of the hind leg, from a contraction of the tendons. This condition is commonly called a "cocked ankle." Such cases may be remedied somewhat by shoeing.

Stifle

A dislocation of the patella, commonly called the "stifle" bone (corresponding to the knee-cap of man), is the most frequent dislocation in animals. A horse

so afflicted is commonly said to be "stifled." In this condition the stifle-bone slips to the outside of the stifle-joint, and the horse is unable to move the hind leg to any extent, especially in bringing it forward.

The causes of this trouble are external violence, especially slipping when the animal is getting up in the stable. It most frequently affects loose-jointed colts that are pastured on hilly or gravelly pastures. A "stifled" animal can scarcely move. The hind leg on the affected side usually stands backward with the toe resting on the ground, the animal being unable to bring it forward. The muscles of the leg seem to be cramped and slightly swollen. There is a lump or swelling on the outside and a little below the stifle-joint. If the animal is forced to move, it goes on three legs, dragging the injured leg.

The treatment consists in replacing the stifle-bone and keeping it in its normal position. Sometimes a sudden movement on the part of the animal, such as would follow a sharp cut with the whip, will cause the bone to slip back into place of its own accord. The better method is to fasten a rope or strap around the affected leg below the fetlock-joint, and while an assistant draws the leg forward the operator pushes the stifle-bone forward and inward, causing it to slip into place with a well-defined "cluck." The horse should be kept standing for forty-eight hours, with the affected leg kept well forward by tying the rope or strap that is around the fetlock through the collar. A sharp fly-blister should be placed on the outside of the stifle-joint. The horse should be allowed gentle

exercise in a level pasture, or given very light work until the ruptured ligaments have thoroughly healed and the parts contracted.

Stifle may become chronic; that is, the stifle-bone may slip out very frequently. In bad cases it may slip out or in of its own accord nearly every time the animal steps. The treatment for these chronic cases is not satisfactory. A stifle shoe can be applied to prevent the animal from getting the foot too far backward. This consists in welding a piece of iron to the shoe and allowing it to extend forward, the end being turned upward. Repeated applications of light blisters, and rest or gentle exercise, give the best results.

Dislocation of the Neck

A partial dislocation of the neck is sometimes caused by the animal's becoming entangled in the tie-rope and being thrown in such a manner as to double the neck under the body. In rare cases the neck may be completely dislocated and the animal still live. In the partial dislocation the head is twisted around to one side and remains in that position, the animal being unable to move it to any extent. Sometimes the difficulty is purely muscular, caused by a paralysis of the muscles from lying too long in a cramped position. Bathing the affected muscles with hot water, and rubbing them well, is usually sufficient to enable the animal to gradually recover the use of the muscles. The dislocation of the vertebræ is difficult to treat.

SPRAINS

A sprain is an injury to a joint caused by violence, which produces more or less injury to the ligaments binding the bones together and the soft tissues of the joint. Sprains usually result from twisting or bending of the joint in an unusual direction.

Severe lameness usually comes on suddenly soon after the injury. The joint becomes inflamed, swollen and tender, and is usually moved with much difficulty. The animal should be kept quiet. If there is severe pain, fomentations of hot water should be applied to soften, soothe and relax the part. When the inflammation is severe and persistent, cold applications in the form of water or bags of ice are beneficial. After the inflammation subsides, if the lameness and swelling persist, liniments well rubbed in or a light blister will hasten recovery. A part that has been severely sprained should have a long period of rest, as complete recovery from a sprain is very slow.

BOG-SPAVIN

Every true joint contains a lubricating liquid called "joint-oil" or synovial fluid. When for any cause this joint oil or synovial fluid is secreted in abnormal amounts, it causes the soft tissues around the joint to bulge outward. When this condition occurs on the hock-joint, it is called a "bog-spavin."

The first symptom is a puffy enlargement on the front of the hock-joint, toward the upper and inner part, due to a distension of the capsular ligament of the joint by

the synovial fluid. It is fairly common in young large-jointed colts, especially of the heavy draft breeds. It is usually caused by strains upon the joints, such as heavy pulling, or any overwork when the animal is too young. It rarely causes lameness; although when the bog-spavin is caused by a severe strain there may be lameness resulting from the injury. In colts, bog-spavins often disappear by the time they are three years old.

The treatment is to cause the synovial fluid to be absorbed. This can usually be done by pressure and cold, applied to the outside of the joint by means of wet bandages. Before putting on the bandages, hand-rubbing the part will often cause much of the fluid to be absorbed. Tincture of iodine may be painted on the part, or iodine ointment rubbed in once daily. When the part begins to get sore this treatment should be withheld for a few days. A small amount of red blister rubbed over the spavin sometimes proves beneficial, but severe blisters should be avoided. A spring truss is made, to be applied to the spavin for an hour or two twice daily. This truss, by exerting pressure, causes the fluid to be absorbed. Bog-spavins should never be opened with a knife. In cases of long standing or in aged horses treatment is unsatisfactory.

WIND-PUFFS

A wind-puff is a condition similar to bog-spavin, except that it does not occur on a joint, but usually between tendons where small sacks, containing synovial

fluid or joint-oil, are situated, to lubricate the tendons as they play over each other. Wind-puffs are usually located on either side of the leg, more particularly on the outer side just above the fetlock-joint, between the back tendons and the bone. They are noticed as rounded or elongated puffy enlargements that feel as if they might contain air. They are usually found on horses that have been subjected to severe exertions, especially to fast work. Wind-puffs seldom interfere seriously with a horse's ordinary work, but they are a serious blemish, and as an animal grows older they are likely to become more marked. In rare cases, the joint-oil which they contain may solidify into hard masses.

The treatment for wind-puffs is the same as for bog-spavins,—iodine, either as a tincture or ointment, hand-rubbing and pressure. Some cases can be successfully treated by drawing off the synovial or joint-oil, by means of a hypodermic syringe, and injecting a solution of iodine. This should be attempted only under the direction of a well-qualified person.

THOROUGH-PIN

A thorough-pin is a puffy enlargement occurring half-way between the point of the hock and the front of the hock-joint. It is the same condition as a wind-puff, —a soft puffy enlargement occurring both on the inside and the outside of the leg, in the hollow just in front of the large tendons which are inserted in the point of the hock. By gentle pressure, the synovial fluid can be pressed through from one side to the other; hence

the name, "thorough-pin." The causes and treatment are the same as for wind-puffs. A pad or truss is also made that can be applied as for a bog-spavin.

CURB

A curb is a bulging or thickening of the ligaments and other tissues on the back part of the hock, just below the point, giving to that part a curved, bulging outline instead of the straight line that is normally presented when the hock is viewed from one side.

Some horses' hocks, because of their rough, weak appearance, are called by horsemen "curby" hocks. They seem to show predisposition to this disease. The exciting causes are severe strains on the hock-joint, such as may occur by heavy pulling, and especially by rearing and jumping. Such movements are often spoken of by horsemen as liable to "spring a curb."

There is usually lameness, associated with some inflammation, at the back part of the hock, followed by the appearance of a bunch, or thickening, of that part. The lameness frequently disappears, but the enlargement persists, leaving a blemish more or less marked. An animal having a curb is always unsound, being unfitted for fast work. But this lameness may not seriously interfere with his usefulness as an ordinary work-horse.

In treating curb, the horse should have rest and a high-heeled shoe on the foot of the affected leg. Mild counter-irritants, in the form of liniments, tincture of iodine or iodine ointment, or light blisters applied to

the part, are of assistance in curing the lameness and removing the enlargement. Should this treatment fail, firing with a fine puncturing-iron must be resorted to.

KNEE-SPRUNG

This is most frequent in aged horses that have been subject to severe work, especially upon the road. It is a condition in which the knees are bent or sprung slightly forward, owing to a contraction of the tendons which pass down the back of the leg. It may occur in young horses as a deformity or as the result of an injury. When the trouble is very slight it can sometimes be remedied by using a thin heel-shoe, and employing hand-rubbing with a mild liniment to the back tendons. Well-marked or chronic cases will require the cutting of one or both of the back tendons. This operation should be performed only by a skilled surgeon.

BREAKING-DOWN

In horses that are used for racing or are otherwise subjected to severe exertion, the ligaments which pass down over the fetlock-joints become ruptured, allowing the joints to fall nearly to the ground as the horse puts his weight upon them. If the rupture is severe there is little hope of recovery, although the animal can often get about fairly well and can be used for breeding purposes. When the rupture of the ligaments is slight, rest, a light blister to the part and a brace attached to the shoe, will often enable the ruptured

parts to unite so that the horse can do light work; but an animal that has suffered from a partial rupture of the ligaments should never again be subjected to severe work.

RUPTURED TENDONS

Owing to severe exertion, the tendons of the legs, especially the back tendons, may be completely or partially ruptured. There is usually severe lameness in the injured tissues, associated with swelling and inflammation. In treating the parts, the inflammation should first be reduced by the application of hot or cold water, wet bandages being applied lightly to relieve the strain. After the swelling has subsided, liniments or light blisters can be used. The parts should not be subjected to severe strains afterward.

CHAPTER XI

DISEASES OF THE ALIMENTARY TRACT AND OF THE DIGESTIVE FUNCTION

THE digestive system includes the mouth, throat, esophagus or gullet, stomach and intestines, with the glands which pour their secretions into this tract, such as the liver, salivary glands and pancreas.

The differences in the mouths of animals are very marked. In the horse the soft palate, or curtain between the mouth and the throat cavity, is long, and is so constructed that it prevents the horse from breathing through the mouth. Cattle and sheep have no incisors, or front teeth, on the upper jaw, but, instead, a pad of cartilage against which the lower incisor teeth close in biting grass. In pigs the teeth are set in a continuous row in the upper and lower jaws. In horses there is an interdental space between the incisors and the molars or grinders. In male horses there is in this space a single canine or "bridle" tooth. These are also found occasionally in mares.

The stomach of the horse is rather small and the bowels are capacious. In ruminants — those animals which chew the cud, such as the cow and sheep — there are four stomachs. The first is the rumen or paunch, which lies on the left side. In adult cattle it has a

capacity of about fifty gallons. Opening from the rumen at its anterior extremity is a small cavity, the reticulum, commonly called the "honeycomb" on account of the peculiar structure of the lining membrane. It is very common to find foreign bodies, nails, etc., in this cavity after death. The next stomach is the omasum, or "manyplies," or "manifolds," situated to the right of the rumen and well forward. The omasum is made up of a large number of folds, like the leaves of a book, and between these leaves the food lodges, and is partly digested. In this stomach the food is always rather dry and firm. The next and true stomach is the abomasum. This is situated just behind the manifolds and to the right of the rumen. The lining membrane of the stomach is arranged in loose folds, which run lengthwise. In examining animals a few hours after death, it is usual to find the lining membrane of the rumen and omasum peeling off readily over large areas. This is due to the action of the digestive juices, which begin after death to digest the stomachs themselves. In the horse there is no bile-cyst or gall-bladder in the liver, as there is in cattle and pigs. Other differences in structure of the alimentary canal are of comparatively small importance.

In dealing with diseases of the digestive system, it should always be remembered that most of them are caused by improper food or feeding, and these sources of trouble should be carefully scrutinized.

SORE MOUTH

Sore mouth in domestic animals usually results from injuries, irritating foods, or germs of disease which gain entrance, grow, and cause canker sores on the membranes or tongue. Among other causes may be mentioned irritating medicines that burn the mouth, harsh bits, projecting molars, or diseased teeth.

The first symptom of sore mouth is usually a disinclination, or inability, to eat properly, especially of coarse food. The horse may "gaunt up," and in some cases there is a discharge of saliva, either watery or frothy, and sometimes the tongue is swollen so that it protrudes from the mouth.

The first thing to be done is to remove the cause, if it can be determined. The animal should have soft food, gruels, milk and mashes. The mouth should be thoroughly washed out with warm water and a mild healing lotion applied with a sponge or soft cloth: a strong solution of alum, or tincture chlorid of iron, two teaspoonfuls to one-half pint of water. These can be applied three times daily. Allowing the animal to lick a little salt three times daily is also excellent. Corrosive sublimate or other poisonous remedies should not be used, except under competent advice, as there is danger of poisoning.

Infectious Sore Mouth of Cattle

This disease attacks cattle of all ages, and appears to be contagious, although it does not spread rapidly; often only one or two cases will occur in a large herd.

In some instances a dozen young cattle running together will all be attacked by the disease.

The first symptom usually noticed is inability or disinclination to eat. There is also a profuse discharge of saliva that drips from the mouth, often frothy, due to the working of the jaws and tongue. Raw, depressed sores appear on the inside of the lips and cheeks, as well as on the tongue, gums and pad of the upper jaw. In most cases the tissue seems to slough out, and the sores are covered in the center with dark-colored dead tissues, whence the popular term, "black-tongue." The edges of the sore are raw and inflamed and often contain a little pus. In some cases the sores are reported to be so extensive that the teeth drop out; in others, the tongue is swollen so severely that it protrudes from the mouth. Associated with the soreness of the mouth there is inflammation of the front feet. The feet are hot to the touch, and tender to walk upon, and the animal appears so stiff in the fore legs that it can move only with difficulty. There is a fever accompanying the disease, the temperature rising, in most cases, to 105° F. All animals fall away rapidly in flesh because of their inability to eat, and in cows the milk flow is lessened.

Sick animals should be isolated from the herd and fed on soft, nutritious foods, such as mashes, gruel, and the like. If left in pastures they may starve, because they cannot eat.

The mouth should be swabbed out two or three times daily with a saturated (all that water will dissolve) solution of borax, applied with a sponge or soft

cloth. The solution of a tablespoonful of alum dissolved in a pint of water is also excellent.

Practically all cases make a good recovery if they are cared for and carefully fed. The greatest loss is due to the falling away in flesh. Milk from affected cows should not be used for human food, nor fed to calves. This disorder is not the contagious foot-and-mouth disease of Europe, an account of which will be found in Chapter XVI.

DISEASED AND ABNORMAL TEETH

All domestic animals are subject to diseases of the teeth, but horses are most frequently affected. Common difficulties are decayed and ulcerated teeth; while split or broken, and irregular or projecting teeth cause much trouble. In horses and cattle, there is a constant wearing away of the molars, or "grinders." This keeps the edges sharp so the food can be ground properly. If, for any reason, a tooth does not come into proper contact with its opposite, there is nothing to wear it away. As a result, it grows out long, and often strikes and lacerates the soft tissues of the opposite jaw (Fig. 48). This causes severe pain and interferes seriously with the animal's eating. When the front teeth, or incisors, of horses do not come evenly together, it will be found that the lower jaw is drawn too far back. This causes the back parts of the upper incisors to be worn away and the front edges to shut over the lower ones, like a parrot's bill; hence the term, "parrot-mouth." Fig. 47. The symptoms of diseased teeth are: difficulty in chew-

ing the food, which is shown by holding the head on one side; "quidding" the food, that is, chewing up quids and spitting them out; and "driving on one line." Frequently an animal will stop eating suddenly; or, when drinking cold water, will stop and slobber the water, evincing pain. In many cases of diseased molars, the saliva has a disagreeable, fetid odor.

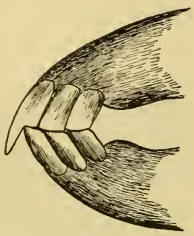

Fig. 47. Parrot-mouth.

When there is much difficulty and pain in eating, the animal falls away in flesh. In horses that are subject to attacks of colic or indigestion the teeth should always be examined, as the trouble may be due to improper mastication of the food. When the roots of molars are ulcerated, the swelling often breaks and discharges pus from an opening on the side of the face or the bottom of the lower jaw; these openings rarely heal permanently until the ulcerated tooth is removed.

Ulcerated, decayed, split and badly broken teeth should be extracted with forceps, never punched out, as the latter method is likely to break the tooth, leaving pieces of the roots in the jaw, where they cannot be removed and are a source of much trouble. It is sometimes necessary, however, to trephine or cut a hole through the jaw-bone, and then punch the tooth out. After such an operation, only milk and gruels should be allowed for ten days, as solid food is liable to get into the wound and keep it from healing. In all cases of removal of a tooth, the opposite tooth

should be filed off at least once a year. A parrot-mouth should be kept filed off level. Irregular and projecting teeth should be cut off or filed off with a "float," until even with the rest of the set.

In horses and cattle, however, the "table," or grind-

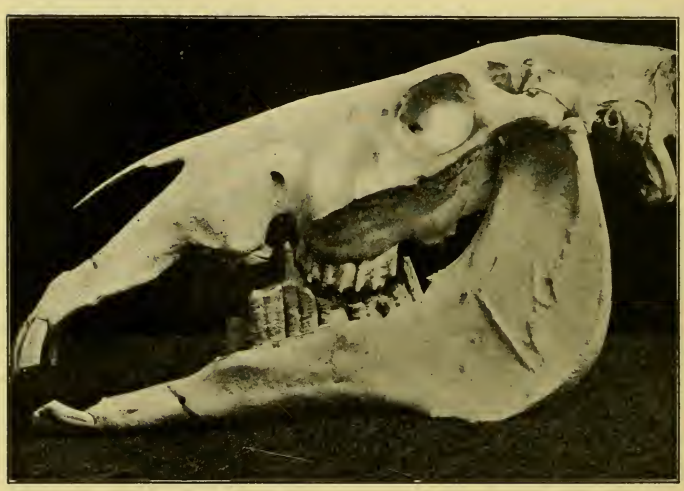

Fig. 48. Projecting molars of horse.

ing surface of the teeth, is naturally rough and sharp. It should not be filed except to remove prominent irregularities.

Horses' teeth should be carefully examined and attended to at least once a year. The practice of itinerant "veterinary dentists," of "fixing" them whether they need it or not, is bad. These fellows often do horses more harm than good.

WOLF-TEETH

"Wolf-teeth" are small extra molars, frequently found in front of the first grinders on the upper, and rarely on the lower, jaw of horses. They are believed to be rudimentary molars, pointing us back to prehistoric horses, fossil remains of which are found with teeth extending in an unbroken row around the jaws. Probably one-half the horses under seven years of age have them. There is a popular idea that wolf-teeth make a horse go blind, but this is not true. They have no more connection with a horse's eyes than any other teeth do.

It is a good plan to have wolf-teeth drawn (not punched out), as they are of no use to the animal and a bit may draw against them and make the mouth sore. When these teeth are punched out, the roots are likely to break off and remain in the jaw, and become a source of irritation.

CRIBBING

Cribbing, or "crib-biting," is a habit that some horses have of grasping some object, biting it lightly, and at the same time contracting the muscles of the neck and emitting a peculiar grunt, frequently sucking in air at the same time. Such horses are called "wind-suckers." Sometimes the horse will simply press the incisor teeth against the object; and, in rare cases, he will arch the neck and suck air without biting anything. Cribbing is a habit or vice. In chronic cases, the front

edges of the incisor teeth become beveled by repeated biting. Fig. 49

It is seldom that a horse will crib on iron. By covering mangers and other stable fittings with iron, the horse will cease cribbing in the stall. A box-stall without manger or projecting wood will prevent the horse cribbing in the stable. In ordinary cases, a broad strap, buckled firmly about the neck, will stop cribbing. The strap should be carefully adjusted, so it will be just tight enough to prevent the contraction of the muscles of the neck. The strap should be removed when the horse is in use. Sawing or wedging the incisor teeth is a bad practice, as it stops the habit only while the teeth are sore. The membrane attaching the tongue to the floor of the mouth is frequently cut to stop cribbing, but its effects are usually temporary.

Fig. 49.
Incisor teeth of a bad cribber.

PAROTIDITIS

This is an inflammation of the parotid gland. There are two of these glands, one on either side of the neck, just below the ear. A contagious disease of similar glands in man is known as mumps.

Parotiditis may be produced by injuries to the glands. In some cases, it may be caused by the throat-strap being too tight, or from pulling on the halter or tie-strap. A sudden change of food, especially of pasture, may be the cause.

Hot fomentations should be used, to reduce the in-

flammation. These should be followed by applications of iodine ointment, tincture of iodine, or a good, stimulating liniment, well rubbed in. If there is difficulty in swallowing, soft foods, gruels and milk should be given. In rare cases, the gland suppurates, or "gathers." As soon as pus can be felt, an opening should be made,—very carefully, as there are important blood-vessels in this region. The pus should be washed out, and mild antiseptics injected, such as a solution of bichlorid of mercury (one part to 1,000 parts of water), or a three per cent solution of carbolic acid.

SALIVARY CALCULUS

The duct that carries the saliva from the gland to the mouth passes under the jaw, winds outward over the lower jaw-bone and empties opposite the third molar. Sometimes a hard mass, or concretion, composed of salts of lime, called a "calculus," forms in the duct, and stops the saliva from passing into the mouth.

The calculus may be removed by working it out into the mouth, or a surgical operation may be required. Great care must be taken in the latter case to prevent a fistula forming, which will allow the saliva to escape on the outside, instead of into the mouth. When such fistulæ do form, it is often necessary to destroy the gland by injecting iodine or nitric acid into it through the duct.

SALIVATION, OR SLOBBERING

This is an excessive discharge of saliva from the mouth. It is frequently seen in horses, cattle and

dogs. It is usually associated with nausea and vomiting. In dogs, it is one symptom of dumb rabies. Salivation may be caused by bad food, drugs, sore mouth, frequently by bad teeth, or by choking and paralysis of some parts of the head or throat.

In all cases the cause of the difficulty should be carefully sought and removed. When the gland is diseased iodine should be applied, either as the tincture, painted on, or as the ointment, rubbed in. Iodide of potassium in one-dram doses, once daily, is excellent for horses and cattle when there is paralysis. It should not be given longer than four days.

SORE THROAT

Sore throat is an irritation or inflammation of the pharynx or the larynx. It may result from irritating substances swallowed, or it may be caused by bacteria growing on the surface or within the mucous membrane which lines these cavities. Sore throat is often associated with some acute disease, such as distemper or influenza in colts and horses.

The most prominent and common symptoms of sore throat are inability to swallow, especially coarse foods, except with difficulty. In drinking, more or less water will run out through the nose. The animal carries the head with the nose protruded, and there is frequently a cough, either dry or moist. The throat is frequently swollen on the outside and is tender under manipulation.

Give soft foods and gruels, as for sore mouth; apply

hot fomentations to the throat, and after drying rub with a stimulating liniment twice daily. When the throat begins to get sore on the outside, withhold the treatment for a few days. Two tablespoonfuls of the solution of tincture of iron, recommended for sore mouth (page 246), is good for sore throat, and it may be given three times daily. A tablespoonful of chlorate of potash finely pulverized and made into a paste with molasses and flour is excellent. A teaspoonful of the paste should be daubed on the back teeth with a small paddle, so that the horse will not swallow it all at once; this can be given every six hours for a day or two.

CHOKING

Choking is a closing of the esophagus with some foreign body or from spasm. It occurs most frequently in cows, but nearly all domestic animals are subject to it.

The most frequent cause of choking is the attempt to swallow some hard body without crushing it, such as an apple, turnip or similar object. In dogs and cats, bones are the most frequent cause of choking. Horses and cattle are frequently choked by bolting dry feed without first thoroughly wetting it with saliva. Some animals are predisposed to choke; in such cases there is probably a constriction or narrowing of the esophagus at the point of obstruction.

The animal first stops feeding and makes frequent attempts at swallowing. Saliva drips from the mouth, the neck is arched, and the muscles contracted. A horse frequently emits a peculiar shriek. When the

obstruction is located in the horse's chest-cavity there are few symptoms except inability to swallow food. Dogs and cats often attempt to vomit. In cattle there is a tendency to bloat in an hour or so after choking.

The proper treatment is to remove the obstruction by getting it up, if possible; if not, by pushing it down. When neither effort is successful, one should remove the object by a surgical operation. If the obstacle is in the throat outside of the body cavity it can usually be seen or felt as a swelling on the left side of the neck. In such cases it should be worked up to the throat, and while an assistant holds it firmly to prevent it from slipping back, the operator should reach down the animal's throat and remove the object. In the cow and dog this is not difficult; but in the horse it is necessary to use a speculum, or other instrument, to keep the mouth open and to prevent the operator from being bitten. If the obstacle cannot be removed in this way, it should be pushed down to the stomach; frequently, if started slightly from the outside, it will pass down without any other assistance. Sterilized (boiled) water can often be injected into the mass near its lower border by inserting a hypodermic syringe through the tissues from the outside, and thus soften and assist in breaking up the mass.

Where the lump can not be felt in the throat it is necessary to push it down with a "probang," a smooth, flexible tube or rod, about six feet long. This is inserted through the mouth, and the obstruction gently pushed down to the stomach. In the horse, precaution should be taken to prevent his biting the probang in

two, and swallowing the lower part. When this instrument cannot be obtained, an excellent substitute is a piece of three-fourths or one-inch rubber hose, five or six feet long. The hose can be stiffened by drawing a piece of rope through it, and cutting it off even with the end. If hose is not to be had, a smooth buggy whip can be used, passing it down butt end first.

If the obstacle cannot be gotten either up or down, and if it is where it can be reached from the outside, the only way left to remove it is by the assistance of a good surgeon. The animal should be confined, and an incision made through the skin and muscles. This incision is pushed to one side, and an incision made through the esophagus, or gullet. This is done so that the two incisions will not come opposite when they are closed. After the incisions are made, and the obstacle removed, the parts are washed clean and the esophagus closed by sewing with catgut, the stitches being taken close together. Afterward, antiseptics are used on the wound, and the outside wound is closed by sewing the skin and muscles with silk. It is now treated as a simple wound. No solid food should be given till the wound heals, as a bad running sore, or fistula, is likely to be formed. Sweet milk with raw eggs beaten in it is excellent; gruels and mashes may be given when the parts have united.

Horses that are subject to choking on dry food should not be allowed to eat rapidly. This can be prevented by arranging the feed-box so that he can get but a small amount at a mouthful. Smooth round stones may be placed in the feed-box. Iron feed-boxes are

especially designed for this purpose. Spreading the food out thin in a manger or on the floor will usually prevent choking.

STOMACH STAGGERS

This disease occurs in horses. It appears to be a congestion of the brain, due to an engorged stomach and active exercise. The stomach, distended with food, presses on the diaphragm, or "midriff," to such an extent that when the animal is exercised the action of the lungs and heart is interfered with, the brain becomes congested, and the animal partially or completely loses consciousness. Some horses are subject to frequent attacks of this disease; such animals are usually greedy feeders.

The attack usually occurs soon after feeding. The horse, on being driven or otherwise exercised violently, becomes distressed for breath and perspires freely. There is an anxious expression on his countenance. He is unwilling or unable to go, even when urged. When forced to move, he goes with a staggering gait, and stands with his legs braced; sometimes he falls and is unable to rise.

Make the horse as comfortable as possible; loosen the harness so it will not check the circulation of the blood; if possible, turn his head toward the wind. Blanket the horse warmly, and rub his legs briskly to get the blood from the heart and lungs toward the outside of the body. Cold water dashed on the head is good. Two ounces of essence of Jamaica ginger in

warm water may be given as a drench, and repeated in thirty minutes, if necessary. The bowels should be emptied by giving an enema,— an injection of warm slightly soapy water. After the acute symptoms have subsided, a ball of five to eight drams of aloes should be given, to move the bowels. In most cases, stomach staggers can be prevented by careful feeding and proper exercise.

IMPACTION OF THE RUMEN

This trouble occurs in cattle, and is due to the filling up of the paunch with indigestible material, such as weeds, dead grass, pieces of cloth or other foreign materials. It is probable that in many cases there is indigestion, associated with a depraved appetite, preceding the impaction.

The animal does not eat, but stands around with the back slightly arched, the breathing slightly increased in frequency, and perhaps a slight grunt with each respiration ; later, there may be some bloating. If the cow lies down, it is usually on the right side. The milk secretion is lessened and the cow grinds her teeth. A heavy, hard mass can be felt low down on the left side.

Give a mild, stimulating purgative, of three-fourths of a pound of Epsom salts and two ounces of ginger dissolved in four quarts of warm water, administered as a drench. Plenty of water should be given to drink and enemas of warm water to move the bowels. If the animal will take food, give gruels and soft mashes.

If medicines fail to give relief, the only remedy is to perform "rumenotomy"—that is, to cut into the paunch and remove its contents through the incision. A skilled surgeon should be employed. The animal should be confined with the right side to the wall, and the incision made on the left side, half way between the point of the hip and the last rib, extending downward five or six inches. An incision is then made in the rumen, a thin cloth being introduced into the wound, to prevent the material from dropping into the abdominal cavity. The contents of the rumen are then removed with the hand, the parts washed clean, the rumen well sewed up with catgut, the stitches close together, and the skin and muscles then sewed. No food should be allowed for twenty-four hours following the operation, and, after this, only milk and gruels for ten days. Coarse food is likely to get into the wound and prevent its healing.

HOVEN, OR BLOATING IN CATTLE

Hoven is a distension of the paunch, or rumen, with gas. It is liable to occur when cattle are pastured on clover or alfalfa, especially if the growth is rank, and from eating frozen roots or pumpkins, but may occur on other kinds of pasture. The tendency to produce bloating seems to be greater when the pastures are wet with dew or rain, or when the food is frozen. Fermentation proceeds rapidly, the gas does not all escape and soon distends the rumen to a large size.

Slight bloating often occurs when cattle are suffering

from indigestion, impaction of the rumen with undigested food, or from choking, but in these cases the gas passes away as soon as the cause of the disease is removed.

Bloating is easily recognized from the prominent symptoms. The first one is usually that the animal stands off by itself and refuses to eat. Upon examination, the belly is found to be greatly distended, particularly on the left side, that part bulging outward and upward like a dome. The animal stands humped up and breathes with difficulty, often emitting a grunt or moan as it breathes. There is often a dripping of saliva from the mouth. There may be colicky pains shown by the animal's stepping uneasily about, or kicking at the belly. The rectum sometimes protrudes, owing to the internal pressure of the gas. As the bloating increases, the animal may stagger and fall. In hoven, the animal may die from suffocation, or, as it loses consciousness, it may fall and rupture some of the stomachs or other organs subjected to the excessive pressure of gas.

The method of treatment will depend upon the condition of the animal. If the bloating is severe, so that there is danger of the animal's suffocating or falling, the side should be tapped at once. This is done after confining the animal by tying the head. A small incision is then made through the skin over the most prominent part of the swelling on the *left* side, about half way between the point of the hip and the last rib. Two instruments, called a "trocar" and a "canula," are then inserted through the hole in the skin, directed

downward and forward, and pushed into the rumen. Fig. 50. The trocar is withdrawn, leaving the canula in the opening for the escape of gas. The gas will rush out, and often bring with it a small amount of partially-digested food. Should the gas not escape, push the trocar into the canula, to clear out the food. In some cases, it is necessary to withdraw the trocar and canula, change its direction and insert it again, using the same opening in the skin. In the absence of a trocar and canula, a pocket-knife can be used, care being taken to direct the edge of the blade downward, so that, if the animal jumps, too large an incision will not be made.

Fig. 50. Trocar and canula.

If the case is not so serious, medicinal remedies will usually give relief. Place a large wooden bit, about the size of a fork handle, on which some pine tar may be daubed, in the mouth and hold it in place by a rope back of the horns. After the bit is secured, a small handful of salt, thrown well back in the mouth, causes the animal to work the tongue, stimulates the flow of saliva, and promotes the regurgitation, or gulping up of gas. A piece of tarred rope, tied through the mouth and back of the horns, is excellent. Turpentine, in two-ounce doses for adult cattle, is a good remedy; but it must be well diluted with milk, to prevent injuring the animal. Hyposulfite of soda, in ounce doses dissolved in water, is good, as is finely pulverized charcoal in heaping tablespoonful doses. Cold water may be dashed over the

body, or cold, wet blankets may be put on and then covered with dry blankets. Aromatic spirits of ammonia, given in ounce doses in water as a drench, is excellent. Essence of Jamaica ginger should be used in four-ounce doses well diluted with hot water. Common baking soda is good, in two-tablespoonful doses in water, as a drench. Gentle walking exercise should be given. Enemas of warm, soapy water should be given, to empty the bowels.

Since there is danger of bloating in turning cattle into luxuriant pasture, they should always be well fed with some dry hay or similar food before the change is made. Keep them from the pasture until the dew or frost is off. In turning cattle on heavy pastures, they should gradually become accustomed to the change by being turned in for twenty minutes the first day, and the time gradually extended each day. Dry hay or similar material in such a pasture is excellent to prevent bloating, as cattle seem to crave it. Animals that show a tendency to bloat should be carefully watched, as there seems to be some indigestion in most of such cases.

GORGING WITH GRAIN

It sometimes occurs that animals, especially horses and cattle, gain access to quantities of grain and injure themselves by eating an excessive amount. Acute indigestion, and even death, may follow.

A purgative should be given at once; for the horse, a quart of raw linseed oil, and for cattle either a quart

of oil or three-fourths to a pound of Epsom salts. These should be given as drenches. Enemas of warm soapy water, or warm water and glycerine, should be given, to empty the bowels. Other food should be withheld, unless hay or other rough material seems to be craved, when a little may be supplied. If the animal is thirsty, a small quantity of water can be given from time to time until the thirst is quenched. It is best not to give too large doses of purgatives, as severe purging often follows gorging; the animal being unable to digest it, the grain acts as an irritant to the bowels. After the acute symptoms have subsided and the digestive system is free from the excess of grain, the animal should be fed sparingly for several days, until the alimentary canal has recovered from the severe strain to which it has been subjected.

INDIGESTION IN HORSES

Indigestion is one of the most common diseases of the digestive system of the horse. It may be caused by the failure of both the stomach and the small intestine to properly digest the food. This brings on abdominal pain and general illness that may last for some days.

Indigestion may be induced by indigestible or bad food, by improper feeding, by diseases or injuries to the mouth or teeth which prevent the proper mastication of the food, by hard work or active exercise soon after feeding, or by insufficient exercise. It may also result from disease of any organs upon which the process of digestion depends.

Indigestion may occur either in a mild or an acute form. In the mild form the horse refuses his usual food, appears sluggish and often lies down, but does not seem to suffer acute pain. Frequently, the horse will paw the ground and look around toward his flank.

For mild cases but little treatment is necessary, Give a light, laxative diet, and allow the digestive system to rest and recuperate for a few days. Bran mashes, fresh grass, etc., are usually sufficient. Two-ounce doses of Jamaica ginger in a pint of moderately hot water, given as a drench three times daily, is excellent. If the horse is out of condition, the following tonic "condition" powders may be given in the food when he begins to eat:

Sulfate of iron	2 ounces
Nitrate of potash (saltpeter)	2 ounces
Gentian root (pulverized)	2 ounces
Nux vomica seed (pulverized)	1 ounce
Ginger root (pulverized)	1 ounce

These are to be thoroughly pulverized and mixed, and a heaping teaspoonful of the mixture given in the food three times daily. In case a horse will not eat the powder, omit the gentian root and add linseed meal.

The causes of acute indigestion are the same as for the mild form; the symptoms are similar, but more severe. The horse suffers much pain, lies down frequently, paws, looks toward his flank and often stands stretched out, as if to pass urine. This position of straining, so frequent in indigestion, leads an ordinary observer to think that there is some difficulty with the urinary passage,—a rare occurrence in horses. In in-

digestion, the pain is usually continuous and moderate, not coming on in severe and intermittent attacks, as in colic.

The treatment is the same as for mild indigestion, except that the Jamaica ginger dose may be repeated every three hours. If the horse is in much pain, an ounce of laudanum may be given two or three times daily. Laxative and easily digested food, with careful exercise, are needed as soon as the horse recovers.

COLIC IN HORSES

Indigestion and colic are the most common digestive diseases of the horse. Colic occurs in two forms: spasmodic, or cramp colic, and flatulent, or wind colic.

Spasmodic or cramp colic is a violent and painful contraction of the muscular coats of the bowels. It is usually caused by some irritant in the bowels, such as undigested food, or cold water when the horse is tired from a long hard drive, exposure to cold which chills the animal, a lack of sufficient exercise, sudden changes of diet, especially from dry to green food, or a large amount of bulky, indigestible food in the bowels.

The pain comes on suddenly and is severe. The horse stops, points toward the flank with his nose, kicks at his belly, or throws himself down violently and rolls. The breathing is rapid, the pulse-beats are increased in number and the animal sweats profusely. The temperature may go up a degree or two as a result of the pain and exercise. In standing, the horse fre-

quently stretches and strains as if in an attempt to void urine. The pain usually ceases in a short time, and the animal appears quiet and free from pain, but in the course of a few minutes to half an hour, another attack, with the same symptoms, occurs.

Get the horse into a comfortable place where he can roll without injury to himself, give an enema (injection) of six to eight quarts of rather warm water, containing half a teacupful of glycerine. The enema should be given slowly and the horse allowed to retain it as long as possible. Give the animal one ounce of laudanum and half an ounce of spirits of camphor, mixed in half a pint of warm water. Jamaica ginger in two-ounce doses, or chloral hydrate in one-half ounce doses, dissolved in one half-pint of warm water, is very good for this trouble. Another good remedy is sweet spirits of niter, in ounce doses. Blankets wrung out of hot water and applied to the belly relieve the pain, as also does rubbing the belly vigorously.

Medicines for spasmodic colic should be well diluted with hot water and given as drenches. In case laudanum is given, the dose should not be repeated too frequently. A tablespoonful of common baking-soda, dissolved in warm water and given as a drench, is excellent.

Flatulent or "wind" colic is severe abdominal pains caused by the accumulation in the stomach or intestines of gases resulting from the fermenting of food.

It comes on more gradually than spasmodic colic, and the pain is more continuous. The pain may or

may not be severe. The gas tends to accumulate in the large intestine, which lies on the right side of the animal. The bloating may be severe enough to interfere with the animal's breathing. The horse lies down, rolls, paws, points toward the flank with his nose, and sweats profusely. The horse may roll on his back, and lie in this position; there is often some gas flatus, passed from the bowels, and sometimes gas may be belched from the stomach, and escape through the nostril.

Enemas of warm, soapy water, or warm water and glycerine, are excellent for this, as for spasmodic colic. Allow the horse to roll, taking precautions that he does not injure himself. Aromatic spirits of ammonia in ounce doses mixed with warm water; turpentine in ounce doses mixed with oil or warm milk; bicarbonate (common baking) soda, in ounce doses and chloral hydrate in half-ounce doses, are also advisable, as is also essence of Jamaica ginger.

In all cases of colic or bowel trouble the cause should be carefully looked for and removed. It is generally a good plan to give a quart of raw linseed oil carefully, or four to six drams of aloes in a ball, to empty the bowels. Oil should not be given following chloral, on account of the danger of choking. It is an excellent plan to diet the horse for a few days, until the disturbed organs have a chance to regain their normal condition.

The following is an excellent colic mixture. It should be kept in a tightly corked bottle to prevent evaporation:

Chloral hydrate	2 ounces
Laudanum	2 ounces
Sulfuric ether	1 ounce
Aromatic Spirits of Ammonia	2 ounces
Essence of Jamaica ginger	4 ounces
Creolin	½ ounce

Two tablespoonfuls in one-half pint of rather hot water can be given at a dose and repeated in one-half hour, if necessary, for three doses, and then one hour apart for several doses, depending upon the severity of the case.

OBSTRUCTION OF THE BOWELS IN HORSES

Impaction of the large intestines of the horse is generally due to feeding large quantities of coarse, indigestible food, such as marsh hay, corn-stover, or straw, without laxative food and exercise. The large intestines become filled with a hard mass of partially digested food, and sickness ensues.

Slight abdominal pains come on gradually, the horse stretches and strains, as if to void urine, kicks at the belly, and points toward the flank with his nose. He lies down, often stretched out flat on his side, remaining quiet, with little or no indication of pain. An examination, made by oiling or soaping the hand and arm and inserting it in the rectum, proves the large intestine to be distended by a hard mass of undigested food.

Give at once an enema of warm, soapy water, or water containing glycerine, not too large in amount, as it is desirable that it should be retained for some time. A quart of raw linseed-oil as a drench should

be carefully given. The abdomen (belly) should be thoroughly rubbed with a sort of kneading motion and a mild stimulating liniment applied, though not enough to blister. Gentle exercise, if the horse is not too sick, is advisable. Give him salt to eat, and plenty of water. A thin mash of scalded bran that he can drink is excellent. Two ounces of essence of Jamaica ginger may be given, or ginger tea made by putting a heaping tablespoonful of pulverized ginger into a pint of hot water, allowing it to cool, and then giving it as a drench. These may be repeated every four hours. Violent purgatives should not be resorted to. Give nature time and a little assistance, and the best results will follow.

CONCRETIONS, CALCULI, HAIR-BALLS, ETC.

Hard masses of indigestible material are frequently found in the stomachs and intestines of animals. In some cases, these calculi are composed of salts of lime and have the appearance of a stone. Sometimes they are a mixture of salts of lime, hair, beards of barley or similar material gathered into a hard mass, which partially or completely close the bowel.

The symptoms vary with the nature of the animal and the location of the calculus, or mass; but, in general, they are those of any other stoppage of the bowels. In most cases, the cause of the difficulty is not recognized until after the death of the animal.

In all cases of stoppage of the bowels, unless the cause is definitely known, an examination should always

be made by inserting the oiled arm into the rectum. In a few cases the obstacle can be felt and removed. When an obstruction of this kind is suspected, copious enemas, mild purgatives, such as raw linseed oil, or small doses of Epsom or Glauber's salts, can be given, with plenty of water to drink and fluid food, as gruels, etc. Hair-balls in the rumen of cattle can be removed by the surgical operation known as rumenotomy (see "Impaction of Rumen" page 260).

INTUSSUSCEPTION, OR INVAGINATION OF THE BOWEL

In this form of obstruction, the bowel slips inside itself Treatment is not satisfactory. Purgatives and copious enemas of warm water are used. Inserting the arm into the rectum and manipulating the large intestine with a sweeping movement of the hand and arm may straighten it.

VOLVULUS, TWISTING OF THE BOWEL, "GUT-TIE"

In this trouble, the bowel becomes twisted on itself in such a way as to obstruct the passage of its contents. The treatment is the same as for intussusception, but nearly all cases are fatal.

INFLAMMATION OF THE BOWELS, OR ENTERITIS

Inflammation of the bowels is a severe and usually fatal disease caused by some irritant, such as undigested food, irritating poisons, stoppage of the bowels, or injury to the walls. Colic, indigestion, volvulus

and calculi, when not promptly relieved, are likely to terminate in inflammation of the bowels.

To an ordinary observer, many of the symptoms of inflammation of the bowels appear like those of colic, but the following differences should be observed. In inflammation of the bowels there is abdominal pain, as in colic, but the pain is more continuous. In inflammation of the bowels there is fever,—the temperature may go from 100° up to 105°; it is usually above 103°. The pulse is small, hard, "thready," and rapid, the horse dislikes to lie down, and, before lying down, will frequently stand with all four feet near together, tread around with the legs partially bent, and hesitate before going down. When he does lie down, he does so as gently as possible, getting down on his knees, or sitting down upon his haunches like a dog, and remaining in this position for some time. In colic, pressure or kneading on the abdomen usually gives relief, but in enteritis pressure on the abdomen causes increased pain. In enteritis, the horse has an anxious, distressed expression of countenance. There is a disposition to walk about in a circle, pausing only to paw, or to attempt to lie down.

Give laudanum in ounce doses, combined with a small dose (half a pint) of raw linseed oil, to quiet the pain. Hot blankets should be applied to the abdomen. Gruels and linseed tea should be given and the horse should be kept as quiet as possible. It is not a good plan to give more than one or two enemas, as they are liable to increase the irritation of the bowels.

In cattle, inflammation of the bowels comes on more

slowly than in horses, and the symptoms are not so well marked. There is abdominal pain, not so severe as in the horse. It is marked by persistent constipation and a rise of temperature to 105° or 106° F. It is usually fatal in cattle. The treatment is the same as for horses, except that the doses for adult cattle should be half as much again.

DIARRHEA, SCOURING

Diarrhea is usually an effort of nature to remove some irritant from the bowels. It is one of the most common diseases of domestic animals. There are frequent movements of the bowels, and discharges are more thin and watery than normal, and are often characterized by a very disagreeable odor. There may be a severe straining, associated with the passing of a small amount of dung.

Diarrhea may be caused by bad food, by overfeeding, by indigestible food or by a sudden change of food. Bolting the food without thorough mastication, or lack of proper digestive juices, may cause the disease. The presence of bacteria in decomposing food, especially in milk fed to young animals, is a common cause, as well as the overloading of the stomach by infrequent feedings and too large amounts of food given at a time. Some horses are predisposed to diarrhea, especially when driving on the road. Such horses are called "slab-sided" or "washy" by horsemen. Usually their ribs are not well "sprung;" they have not a round, full "barrel." There is a common belief that horses

of light sorrel, buckskin or dun color are more subject to diarrhea than those of more decided colors.

As diarrhea is an effort of nature to remove an irritant, it follows that it should not be checked too suddenly. First, locate and remove the cause. A small dose (about two ounces for horses and cattle, and a half ounce for calves) of castor-oil combined with an ounce of laudanum, and given as a drench with a little linseed gruel is excellent. For calves and lambs, a small quantity of dried blood (one teaspoonful to one tablespoonful), given in dilute milk or gruel three times daily, will usually stop the trouble. For calves, it is usually a good plan to dilute the milk with one-third lime-water, and to feed them frequently, but only small amounts at a time. Parched flour added to boiled or sterilized milk is also advisable. Lime-water can be made by pouring water on fresh lime. After the lime is slaked and settled, the water can be poured off and used. Essence of Jamaica ginger well diluted with hot water is very good. In persistent cases, use an astringent, such as oak-bark tea. This is made by steeping the inner bark of white oak. For a horse, a teacupful of this tea combined with an ounce of laudanum should be given as a drench twice daily. Horses that are subject to diarrhea while on the road should be watered sparingly before and during the drive. Prepared chalk in one-half to ounce doses twice daily is useful in such cases.

CONSTIPATION

This condition is the opposite of diarrhea; the bowels do not move as frequently as they should; the feces (dung) are hard and dry, and are often passed with much effort. An animal suffering from constipation is said to be costive, or "bound up."

Constipation is usually due to bad food, improper feeding, lack of exercise or of sufficient water, and in some cases to deficient secretion of digestive fluids. Constipation is frequently associated with other disorders, especially with diseases of the lungs; under these circumstances no special treatment is needed, as the bowels will return to their normal condition when the other disease is cured.

Unless the case is severe and persistent, violent purgatives should not be used. Better results follow the use of laxative foods, such as thin bran mashes, fresh grass and linseed gruels, combined with moderate exercise. Enemas of warm, soapy water or warm water and glycerine should be injected to empty the bowels. Small doses of castor-oil and raw linseed-oil are good. In cattle and sheep, Epsom salts is usually sufficient. In cases of chronic constipation, the following tonic for the bowels is to be recommended:

Pulverized ginger root	2 ounces
Pulverized nux vomica seed	2 ounces
Pulverized gentian root	2 ounces
Sulfur	2 ounces
Common salt	8 ounces

Mix thoroughly and give a teaspoonful in the food three times daily.

WHITE SCOUR

This is a severe and often fatal diarrhea that attacks calves, and rarely lambs and colts. The disease may appear within a day or two after the calf is born, and often occurs as a contagious disease, attacking all calves that are dropped for some time, especially during the winter or spring. The disease is caused by a germ that enters the calves' system, in most cases through the navel.

There is a severe diarrhea, which produces great weakness and general prostration. The eyes are sunken, the ears cold, and the mucous membrane of the mouth is cold and bloodless. The discharges from the bowels have an offensive odor.

The cow should be placed at once in clean dry quarters, where no sick calves have been confined. As soon as the calf is dropped, the "cord" should be tied close to the navel, and both thoroughly wet with a solution of tincture of iodine, or a solution of one part of carbolic acid to five parts of water. Iodine usually gives the best results. Fresh milk, diluted one-third with lime-water, in which a teaspoonful of dried blood has been dissolved, should be given to the calf in small quantities frequently. Where this disease occurs in buildings, all pregnant cows about to calve should be removed to uninfected quarters.

CROP-BOUND FOWLS

In the spring when chickens first roam and gather food for themselves, they are likely to swallow a large

amount of dry indigestible grass. The same condition is often brought on by feeding them grass in large quantities when they are not used to it. This dry grass remains in the chicken's crop as a hard undigested mass that is likely to cause death.

The best plan is to give the chicken a tablespoonful of sweet oil, or as much as it can be forced to swallow. The gullet must then be held between the fingers to keep the oil from working up, while the mass in the crop is manipulated, broken up and mixed with the oil. This may be repeated two or three times daily until the chicken is relieved. Some of the grass can be removed by working it up the gullet and out of the mouth. Water can be injected with a hypodermic syringe as recommended for choking.

When it is not possible to relieve the chicken in this manner, the crop may be cut open, the contents removed, and the crop sewed up with catgut, taking the stitches close together. The skin should be closed with a separate set of stitches. After the operation, the chicken should have nothing but milk or other liquid food for a week, or until the crop has healed. Unless the fowl is a valuable one, it is seldom worth the bother of an operation and after-treatment.

CHAPTER XII

DISEASES AFFECTING THE RESPIRATORY SYSTEM

THE commonest disease of the respiratory system is catarrh, in some one of its many forms.

Catarrh is an inflammation of a mucous membrane, associated with an excessive discharge of mucus. It may attack any mucous membrane of the body, but unless some other region is specified it is understood that the name catarrh refers to the disease affecting the mucous lining of the nose and throat. The two kinds of catarrh (of respiratory passages) are acute and chronic.

ACUTE CATARRH

Acute catarrh comes on rather suddenly, and is generally severe. It is often associated with an infectious distemper, or influenza. A "cold in the head" is a form of the disease. Catarrh is frequently brought on by exposure to cold and wet when the animal is warm or out of condition. It sometimes passes from animal to animal. Most large sale stables are infested with an influenza, which manifests itself as acute catarrh.

The animal appears dull. There is often a chill in the early stage, followed by fever. The mucous membranes of the nose and eyes are congested and red. There is a discharge of mucus from the nostrils,

at first thin and watery, but later becoming thick, and, in some cases, quite pus-like (purulent). The bowels are usually constipated.

Give the patient comfortable quarters, blanket warmly and supply laxative, easily digested food. A small tablespoonful of saltpeter (nitrate of potash) should be added to the drinking water once daily. Steam the horse's head by placing a blanket over it and setting under this a pail of boiling water containing a tablespoonful of carbolic acid. As the water cools, more steam can be generated by plunging heated irons or stones into the pail.

CHRONIC CATARRH

In chronic catarrh, there are few symptoms except a discharge of mucus or muco-purulent matter, thick or thin, from one or both nostrils. It is usually most profuse when the animal is first exercised, or when the head is lowered to drink. The catarrh may be of long standing, and the animal be somewhat debilitated as a result. In bad cases, pus may collect in one of the nasal chambers (sinuses). This may be discharged in lumps, or the bones of the face may bulge, from the pressure of pus inside ; in some cases, the bone softens and the pus is discharged through it to the outside. Sometimes there is a snorting cough.

The treatment for chronic catarrh is to provide comfortable quarters, plenty of nourishing, laxative food and to give good care. Tonic condition powders may then be made after the following formula :

Sulfate of iron (pulverized)	2 ounces
Nux vomica seed (pulverized)	1 ounce
Gentian root (pulverized)	2 ounces
Nitrate of potash (pulverized)	2 ounces

Mix the ingredients thoroughly, and give a teaspoonful in the feed three times daily. Steam the head and spray the nostrils once daily with the following: Boric acid, 2 drams; warm water, 1 quart. In some cases, there is a collection of pus in one of the cavities of the head. It is best to trephine (cut open) the bone and wash out the cavity with the above solution. Such a measure greatly hastens the cure of the disease.

Other diseases that resemble chronic catarrh are the ulceration of a molar in the upper jaw, and glanders, described elsewhere (Chapter XVI).

BRONCHITIS

Inflammation of the bronchial tubes is one of the most common diseases that attack domestic animals. It is usually acute, but may be chronic. It is often associated with pneumonia or inflammation of the lungs.

Exposure to cold and dampness, especially when warm, is the most common cause; also foreign substances, such as smoke or medicines, that irritate the bronchial tubes. It sometimes follows sore throat and often starts as a severe cold.

Bronchitis usually begins with a chill, which may last from five minutes to an hour. It is followed by

a high fever, in which the temperature may go to 106 degrees. The pulse is full, soft and rapid, sixty to eighty beats per minute. The respirations are hurried, but not labored. There is a cough, which, in the early stages, is short, dry and husky; but in the later stages it becomes moist and suppressed, a frothy mucus often being coughed up. The appetite is lost or impaired, and the bowels constipated. In the early stages, the dung is hard and dry, but as the disease progresses, it often becomes coated with a slimy mucus. The urine is scant and high-colored. By applying the ear to the front part of the chest, one can hear a rattling sound, like forcing air through frothy mucus. Just back of the shoulder a whistling sound (sibilus) can be heard as the air rushes through the small bronchial tubes. The expired air is laden with moisture, and the mucous membrane of the nostrils is congested and red. Horses stand during this disease, while other animals usually lie down.

Hygienic treatment is best. Supply clean, warm, dry quarters, with plenty of fresh air, but no draughts. Clothe the animal warmly and apply over the chest a blanket wrung out of cold water, with dry blankets over this. The wet blankets should be renewed every hour. During the chill, give stimulants, whiskey in two-ounce doses, sweet spirits of nitre in ounce doses, or aromatic spirits of ammonia in ounce doses; and repeat these doses every hour until the chill is stopped. Then give small doses of aconite, fifteen drops of the tincture alternating with one-half dram of fluid extract of belladonna. Two-dram doses of

the carbonate or chlorid of ammonia, given three times daily, is excellent to promote the discharge of mucus. After the first acute symptoms have subsided, a mustard plaster may be applied to the lungs. The food and water and general care should be the same as recommended for pneumonia. Two weeks should be allowed for a complete recovery.

CONGESTION OF THE LUNGS

This is an engorgement of the lungs with blood. While it is one of the symptoms of acute lung disease (congestion preceding inflammation), it may occur without any complications. It is a common disease among horses during the winter season.

Congestion of the lungs usually occurs in horses which are too fat and lack sufficient exercise. If to these conditions is added a foolish or drunken driver, the disease may be confidently expected.

The horse is distressed for breath, and wants to stop; he sweats freely, frequently turning his head toward his side; there is trembling of the muscles and an anxious expression of the face. The breathing is rapid and labored; the flanks heave rapidly; the nostrils are dilated and the mucous membrane is congested and red.

Stop work, loosen the harness, and blanket warmly. Rub the legs to promote circulation, and apply a cold compress to the lungs. After the first acute symptoms have subsided, give stimulants, such as alcohol in two-ounce doses, or carbonate of ammonia in one-ounce

doses, well diluted with water, and apply a mustard plaster to the lungs if the congestion continues.

PNEUMONIA, INFLAMMATION OF THE LUNGS, LUNG FEVER

Inflammation of the lungs is a rather common disease in all domestic animals. There are several forms of the disease, depending on the part of the lung most seriously affected. If the outer covering (pleura) is also diseased, the name pleuro-pneumonia is given; when the bronchial tubes are also affected, the trouble is called broncho-pneumonia. If the disease is confined to one lobe of the lung, it is called lobar-pneumonia. Again, the disease takes different names according to the character of the discharge thrown off by the lungs; so that there are croupous pneumonia, catarrhal pneumonia, and the like. The treatment for the different varieties is the same.

Exposure, especially when warm and sweaty, brings on this disease. It occurs most frequently in cold weather. In many cases it seems to start as a severe "cold." Any irritating substance in the lungs may produce it, such as medicine poured into the nostrils which often gets into the lungs. Damp, dark and crowded stables predispose animals to pneumonia. True pneumonia is probably caused by germs or bacteria, and is often infectious.

Pneumonia usually starts with a chill, which is followed by a fever, the temperature of the patient gradually rising to 104 or 105 degrees Fahrenheit. In some cases, in the early stages, there are colicky pains,

resulting from pleurisy. The respiration is rapid, the animal standing with the head drooping, the ears lopped, and elbows turned out; this position is usually maintained throughout the course of the disease. In cases that prove fatal, horses will stand until they fall from exhaustion, after which they die very soon. When animals lie down with pneumonia, they usually lie on the side that is the most seriously diseased. The pulse is rapid, small, and rather hard, varying from sixty to eighty beats per minute. The appetite is wanting and the bowels constipated. By placing the ear to the chest, over the region of the lung, a rattling sound (crepitus) is heard, in place of the normal murmur. Or, if the lung is badly diseased, it may be solidified (hepatized) so that no air can enter; in this case there is absence of sound. Animals sick with pneumonia like fresh air and will often place the nose to a door or window, if one is accessible. When pleurisy is associated with pneumonia, there is a well-marked pleuritic line running from the point of the hip downward and forward towards the lower end of the ribs. This is due to a contraction of the muscles to prevent the ribs from moving more than necessary, as friction between the lungs and ribs causes pain.

Pneumonia runs a definite course, the temperature reaching its highest about the sixth day. All the treatment should be directed toward keeping the animal comfortable and conserving its strength. The body should be warmly clad, the legs rubbed lightly and bandaged, and the animal placed in a warm, dry

and well-ventilated stall where there is plenty of sunlight. The food should be nourishing and easily digested, as sweet milk alone, or with raw eggs beaten in, gruels, oats steamed or dry, apples, etc. Cold compresses, made by folding blankets, wringing them out of cold water, should be placed firmly against the lungs, and covered with dry blankets. These should be continued several hours, and changed frequently. When they are removed, the part should be rubbed dry, and a stimulating liniment or mustard plaster rubbed on. The mustard is mixed with tepid water to a thin paste and rubbed into the hair over the lungs. When the plaster has acted sufficiently it should be carefully removed with a curry-comb.

In giving medicine, great care must be exercised not to excite or to choke the animal, because more harm than good results from harsh treatment. Do not drench a horse suffering from pneumonia unless it be really necessary. In the early stages, during the chill, stimulants may be given,—whiskey in two-ounce doses, or an ounce of spirits of nitrous ether. These may be repeated in an hour. After the chill is over, the fever may be treated by giving small doses, fifteen drops, of the tincture of aconite, alternating with thirty drops of fluid extract of belladonna, every hour. A heaping teaspoonful of saltpeter (nitrate of potash) may be given in the drinking water twice daily. As soon as the fever begins to subside, the other medicines may be stopped and one-half dram of iodide of potash be given twice daily for two or three days.

In the early stages of the disease enemas (injec-

tions) of warm soapy water, or water with two ounces of glycerine, may be given to empty the bowels. Purgatives should not be given. Three weeks should be allowed for complete recovery.

INFECTIOUS PNEUMONIA

An infectious pneumonia sometimes occurs, either among horses or cattle. It seldom spreads rapidly or extends over a very large area. The symptoms are those of ordinary pneumonia, except that its progress is not so rapid and the disease is seldom so acute. The treatment is the same as for ordinary pneumonia, and, in addition, careful attention should be paid to the surroundings, food and water. All healthy animals should be removed from infected quarters, and the latter should be thoroughly disinfected before healthy animals are placed in them.

CONTAGIOUS PLEURO-PNEUMONIA

This is a disease of cattle, slow, chronic, and insidious, which was introduced from Europe, where it has caused heavy losses to the cattle industry. The federal government, through the Bureau of Animal Industry, has completely eradicated this disease from the United States, no case having occurred for ten years. Suspected cases should be at once reported. For a description of this disease, see reports of the Department of Agriculture.

PULMONARY EMPHYSEMA, HEAVES, OR BROKEN-WIND*

This is a chronic disease of horses, due to a dilation or rupture of the air-cells of the lungs. It is usually associated with a chronic form of indigestion.

Heaves is usually the result of improper food or feeding, and is most frequently seen in greedy feeders. Overfeeding, especially with dusty or moldy hay, is a common cause. Fast driving or hard work on a full stomach may induce the disease. There may be an hereditary tendency to the disease.

In most cases, the disease comes on gradually, but fast work on a full stomach brings it on suddenly. The breathing is labored, the air being taken in (inspired) with a peculiar outward twist of the ribs. When the air is forced out (expired), there is a double movement of the flank: when expiration begins, the flank falls; then there is a short pause, followed by a decided contraction of the muscles, which causes a heaving of the flank and belly. All the breathing symptoms are most distinct when the stomach is full of food or water, and the horse is exercised. In most cases of heaves there is a deep, moist, grunting cough, most frequent when the food or the air is dusty. There is considerable gas passed from the bowels, especially when coughing. The nostrils are dilated, and frequently there is a discharge of thick mucus from the nose. Horses badly afflicted with heaves are unable to perform hard or fast work without stopping frequently to breathe.

*"Roaring," due to a paralysis of the muscles of the throat, is also called "broken-wind" by horsemen. See pages 288-9.

Severe cases of heaves are incurable, although much can be done to alleviate the trouble. The treatment is hygienic and dietetic. The quarters and food should be made free from dust. In feeding, the hay should be sprinkled with water. The food should be nutritious, easily digested, but not bulky. A run at pasture is excellent.

The best medicinal treatment consists in giving arsenic, in the form of Fowler's solution, beginning with two teaspoonfuls in the food three times daily and increasing to a tablespoonful three times daily, and continuing from one to two months. The animal should be closely watched for symptoms of arsenical poisoning, and the medicine stopped, should any symptoms appear. Other remedies are: Small doses of aloes, about a dram, given as a ball every few days; oil of tar, in two-dram doses, two or three times daily. Any medicine that promotes digestion is beneficial,—as ginger root, pulverized, in tablespoonful doses three times daily, or a teaspoonful of pulverized nux vomica once daily. In any treatment, careful attention should be given to the diet.

ROARING, OR WHISTLING

This disease, which afflicts horses, is due to a paralysis of the muscles of the larynx, together with one of the vocal cords. This paralysis diminishes the caliber of the larynx to such an extent that the horse has difficulty in taking sufficient air, especially when exercised vigorously.

This trouble may follow a local injury to the throat. It is frequently a sequel to distemper. It is also frequently seen among race-horses and others that are subjected to severe work that taxes the respiratory powers. It is often hereditary. Some stallions habitually transmit this weakness to their colts. Horses with long slender necks seem to be predisposed to this disease.

The disease comes on gradually; there is a slight roaring or whistling sound, made when the air is taken in (inspired). As the disease progresses, the breathing becomes more difficult and the sounds louder. The sounds are most distinct when the horse is exercised violently. In severe cases, a horse can travel rapidly only a short distance without "choking down."

Roaring derives little benefit from treatment. In the early stages, repeated light blisters, applied to the larynx, may be beneficial. Removal, by a surgical operation, of the vocal cord and the cartilage to which it is attached, gives relief in a few cases. A tracheotomy tube can be inserted in the windpipe of a horse used for speed, though it is a temporary measure. It cannot be used permanently on account of the irritation it causes.

Roaring is sometimes called "broken-wind," but it must not be confounded with heaves, to which that name is also applied.

CHAPTER XIII

DISEASES AFFECTING THE BRAIN AND NERVOUS SYSTEM

As compared with man, domestic animals are affected by few diseases of the nervous system. This is probably due, in part, to the higher development of the nervous system in man, as well as to the greater strain to which it is subjected. Insanity and the other mental diseases in man that may be caused by worry and excesses, are practically unknown among animals. Some of the so-called "nervous diseases" are merely symptoms of other disorders; but, inasmuch as the farmer recognizes symptoms as diseases, it has seemed best to include in one chapter the common diseases that manifest themselves chiefly in the nervous system.

HYDROCEPHALUS

Hydrocephalus, commonly called "water on the brain," sometimes occurs in foals, calves and other young animals at birth. The skull is enlarged and the brain is largely replaced by a watery fluid. See Fig. 41, Chapter IX. Animals affected with this disease seldom live, and when they do are of no value. The best plan is to destroy them at once, as there is no treatment known that is satisfactory.

"DUMMIES"

When hydrocephalus develops in adult horses, the animals gradually lose their mental powers and are commonly called "dummies." Such animals are often traded off as soon as the owner suspects the difficulty.

While standing, the horse seems to be asleep, resting the head on the manger; the eyes are partially closed and the legs often crossed, or one foot rests on the opposite one. When eating, the horse appears to go to sleep with the food in his mouth, and, in drinking, usually plunges his head to the bottom of the trough, withdrawing it only to get breath. In moving, the horse lifts the feet high, and in backing drags them along the ground. He comprehends but little, and it is with difficulty that he can be made to work. He may be subject to "fits" especially when exercised violently.

Good care and good food are needed, when treatment is attempted. Iodide of potash in dram doses may be given once daily for a few days, then withheld for a week, then repeated. A "dummy" is of little value, scarcely worth treating.

TETANUS, OR "LOCK-JAW"

This disease produces a contraction of some or all of the voluntary muscles of the body, associated with an excited condition of the nervous system. It occurs in horses and mules, rarely in other animals. It also attacks man.

Tetanus, or "lock-jaw," is caused by a germ or bacterium that usually enters the system through a wound. Once inside, the germs multiply rapidly, and produce violent poison that acts upon the nervous system, causing the voluntary muscles to contract and, at the same time, creating nervous excitement. The germs are believed to be numerous in the soil about barns and stables. They are especially liable to enter wounds of the feet, although any surgical operation or the least break of the skin offers an opportunity for infection. When tetanus occurs without any visible wound, the germs are believed to enter the system through minute wounds, or through a mucous membrane, such as the digestive tract.

Tetanus generally centers in some set of muscles, such as those of the neck, head, jaws, or back, although all the muscles may be more or less affected. The first marked symptom is usually inability to eat, the muscles of the jaws being firmly contracted. The horse becomes stiff all over; the head is elevated and the nose protrudes; the tail is arched in a peculiar and characteristic manner. If forced to move, the animal has a stiff, paddling gait. Great difficulty is experienced in backing the horse. He is easily excited, especially by a slight blow under the jaws. The "haw" is drawn across the inner corner of the eye. The animal grinds his teeth. The affected muscles are rigid to the touch. The flank is usually "tucked up." The animal gives evidence of being seriously ill.

Put the horse into comfortable and quiet quarters. On no account allow inquisitive visitors to see him. The

stall should be slightly darkened and supplied with soft bedding. If the wound where infection took place can be located, it should be opened, to give free access to air, for this prevents the germs from growing. The wound should be thoroughly cleansed, and antiseptics, such as carbolic acid (one part in twenty parts of water), applied to the wound twice daily. Tetanus usually shows itself in four to twenty days (in most cases about ten days) following an injury. Horses suffering from this disease should not be drenched, as this treatment excites them too much. Fluid extract of belladonna, one dram, may be made into a sticky paste with molasses and flour and applied to the tongue every two hours for five or six doses, or until the animal is quiet. Morphine may be used in the same way in one- to two-grain doses, or the same amount may be injected under the skin of the neck or shoulder with a hypodermic syringe. A remedy that has given good results, although but recently introduced, is the following: Carbolic acid, 95 per cent, two ounces; glycerin, one ounce; distilled water, one ounce. Inject one dram hypodermically every two hours for forty-eight hours, then once in four hours. In all cases, the horse must be kept as quiet and comfortable as possible. If the horse can drink, give sweet milk, and gruels containing raw, beaten eggs. If he can eat, give laxative food, such as mashes and fresh grass. Cases of tetanus in which convulsions have set in are usually fatal. Several weeks must be allowed for recovery after the acute symptoms disappear.

STRINGHALT, CHOREA

Chorea is a disease known by a spasmodic contraction of some of the voluntary muscles. The muscles twitch or tremble. The cause and real nature of this disease are not known. It is similar to St. Vitus' dance in the human family. It usually occurs in animals of a nervous disposition. Chorea in some of its forms is frequently seen in horses and dogs; in the latter it sometimes occurs as a sequel to distemper. It is probable that several diseases, or symptoms of several diseases, are confounded loosely under the general term chorea by the layman; but for practical purposes here they may all be considered together.

There are several forms of the disease, and the symptoms vary accordingly. One of the most frequent forms is stringhalt in horses. This is a marked spasmodic jerking up of the hind leg as the horse travels. In some cases it is seen only when the horse first starts, after standing in the stall, and disappears after a few steps have been taken. There is a form of stringhalt that sometimes follows punctured wounds of the foot, and disappears as soon as the wound heals. Another form of chorea is shown by the inability of the horse to lift the hind foot, which seems to be fastened to the floor. When he does get it loose it is lifted up high, and is held a moment in that position. This form of the disease is called "immobility," and is most pronounced on making the horse "stand over" quietly, after he has stood in the stable for a time, especially over night. The symptoms usually disappear if the

horse is made to jump quickly by a cut from a whip, or after walking a short distance.

These forms of chorea are most severe in cold weather and usually gradually increase in severity as the animal grows older. In dogs, chorea is usually seen as an irregular jerking of the muscles of the head or some other part, or even the entire body. In horses, there is sometimes a jerking of sets of muscles, unless the disease is severe. Chorea does not seem to cause suffering, nor to interfere seriously with the general health of the animal.

In most cases of chorea, medicinal treatment does not give great benefit, unless it is the result of other disease. Good results often follow careful feeding and tonics. The food should be nutritious, easily digested, of good variety, and abundant. For horses, a mixture of oats, oil-meal and bran is good. Give the horse three times a week the following: Common salt, four ounces; sulfur, two ounces; hard-wood ashes, two ounces;—a tablespoonful of the mixture in the feed. Also, give Fowler's solution (of arsenic), beginning with half-ounce doses in the feed, once daily, and gradually increasing by one-fourth ounce at a time until one ounce is given at a dose in the morning and the same at night. The arsenic should be given for two weeks and then withheld for two weeks and repeated. Dogs may be given Fowler's solution, beginning with one-drop doses once daily and increased one drop a day until five to ten drops (depending on the size of the dog) are given three times daily. Simple syrup of hypophosphites should be given in

teaspoonful doses three times daily with the arsenic. This treatment may be continued for two or three weeks, then stopped for two or three weeks, and then repeated. In some cases, cutting the lateral extensor tendon just below the hock joint gives permanent relief to horses having stringhalt, and this is not a dangerous operation.

FITS, EPILEPSY

Horses are sometimes subject to fits, which render them wholly or partly unconscious. In some cases they appear to be in a frenzy of excitement; they stagger about and often fall. Animals subject to fits are dangerous for driving, because they are wholly irresponsible during an attack; and they frequently cause serious injuries to themselves and to those dependent on them. A horse is usually attacked by a fit while being driven, and without any premonitory symptoms, often floundering, rearing or plunging, and sometimes running away or dashing into dangerous places.

During the attack, the horse should be freed from the vehicle, and the harness loosened or removed. Cold water dashed over the head generally gives relief. The cause of the difficulty should be looked for and removed, if possible. It may be over-feeding, or a tight-fitting collar or throat-latch, or any other condition that interferes with the circulation. Real epilepsy is incurable, and a horse suffering from such fits should not be placed in any position involving responsibility. Many causes are responsible for fits.

If the animal is subject to them, a skilled veterinarian should be consulted.

SUNSTROKE, HEAT EXHAUSTION

In hot weather and when subjected to hard or fast work in the hot sun, horses sometimes lose consciousness and fall; or, as it is commonly expressed, they "have a sunstroke." Sunstroke differs from fits in the absence of excitement. The breathing is slow, and often of a snoring character; the pulse is slow, and not distinct.

The harness should be removed and the horse placed in a comfortable position in the shade, and propped up on his brisket. Cold water should be dashed on the head, or cracked ice in a bag be applied to the poll. If the horse is conscious enough to drink, small quantities of cool water should be offered frequently. Four ounces of whiskey may be given, diluted in cold water. The horse should be sponged with cool water and rubbed briskly all over till he is dry and rested. Plenty of fresh air should be allowed, without a draught.

The same treatment is to be given horses that have been over-driven in hot weather and are suffering from heat exhaustion.

APOPLEXY

Apoplexy is a very rare disease in animals. It is caused by the rupture of a blood-vessel in the brain, producing temporary unconsciousness and a loss of

control of certain muscles. This condition persists for some time, or may be more or less permanent. Apoplectic fits come on suddenly, and, after the animal gains consciousness, recovery is slow. Parturient apoplexy in cows is a different disease. See page 212.

An animal that has had a stroke of apoplexy is of little value and treatment is seldom worth while.

PARALYSIS

True paralysis is a lack of control of muscles, caused, in most cases, by injuries to the nerves. In all diseases where there is total or partial unconsciousness, there is a lack of control; but, in true paralysis, the animal appears well, except that certain muscles are weak and flabby, and the animal has little or no control over them. There is no pain, unless associated with an injury or caused by the pressure of a tumor. In old animals, there is often a paralysis of some of the muscles of the face. As a result, the healthy muscles pull the affected ones in the opposite direction, giving the face a wry appearance. Paralysis resulting from an injury usually disappears as the part returns to its normal state. In certain cases, rubbing the affected muscles with a stimulating liniment, and giving nux vomica internally, may be beneficial. Electricity is useful in some instances. Tincture of nux vomica may be given in doses of one drop (for a small dog) to thirty drops (for a horse), three times daily. Should any twitching of the muscles occur, the dose should be reduced or stopped altogether.

CHAPTER XIV

DISEASES AFFECTING THE SKIN AND EYE

DISEASES of the skin of animals can usually be traced to one of the following causes: parasites, either animal or vegetable; uncleanliness, which interferes with the functions of the glands of the skin; improper food or feeding; a disease of the nerves which is shown by an intense itching of the skin. Some of the commoner skin manifestations are brought together in this chapter for the convenience of the reader, even though they may not be closely related as to cause.

"HIDEBOUND"

This is not a disease, but only a symptom; although the term is commonly used by horsemen as if it meant a disease. In "hidebound" horses, the skin appears dry and shrunken on the bones. Such animals are out of condition, usually from being poorly nourished, either from a lack of sufficient food of good quality, or from inability to assimilate the food. In most cases, the remedy is abundance of nourishing and easily digested food; when this has been supplied without relief, other causes, such as diseased teeth, derangement of the digestive tract, or some chronic disease, as tuberculosis, must be looked for.

ECZEMA, INFLAMMATION OF THE SKIN

Eczema is inflammation of the skin, associated with small blisters. It is usually found in horses in good flesh and that are fed on rich food. It is most common toward the spring of the year, when the hair is long, or when the animal is beginning to shed its coat.

The skin is red and slightly thickened, with small eruptive blisters that discharge a gummy substance that dries about the roots of the hair. When the horse is driven or worked so that he sweats, intense itching of the skin results. This is most severe in the region of the neck, although the legs are frequently affected.

If the hair is long, it should be clipped. The parts should be thoroughly cleansed by washing with tar soap, then wiped dry, and a small quantity of oxide of zinc ointment, or other bland ointment, rubbed into the skin. Internally, the horse should be given four ounces of Epsom salts once daily until the bowels move freely; then the following:

Nitrate of potash	4 ounces
Common salt	4 "
Sulfur	2 "

Pulverize, mix, and give a heaping teaspoonful in the feed twice daily.

In all cases of itchy skin diseases, a thorough and careful examination should be made for parasites, especially lice.

MUD FEVER

This is a common name given to an inflammation of the skin of the legs, usually caused by the irritation produced by mud and water in the spring of the year. In geldings it is sometimes caused by urine spattering against the fore legs.

The skin is inflamed or tender. The hair looks rough, and it may come out in patches. The skin at the roots of the hair is scurfy and gummy.

The treatment is practically the same as for eczema, except that internal medication is required only in severe cases. After the hair is clipped, the legs should be well dressed with some bland oil or ointment, such as castor oil or vaseline, before driving the horse in mud or wet. Keep the legs clean.

SCRATCHES, GREASE-HEEL

Scratches is an inflammation of the glands of the skin, especially in the region of the heels. When a similar condition occurs in front of the hock joint it is called "sallenders"; at the back of the knee on the fore leg it is called "mallenders."

In most cases, scratches is caused by some external irritant, such as mud, wet, or filth. It occurs most frequently in the winter or spring when the roads are muddy, or when the horses are confined in filthy quarters. The reason the disease usually occurs in the hind legs is because of their proximity to the manure. In some parts of the West, where alkali soils

prevail, the dust sticks in the hair when the horse sweats, and causes scratches in midsummer. Rope-burns under the fetlock may also cause scratches. Certain coarse-legged horses of the heavy draft type, with a thick growth of hair on the legs, are predisposed to this trouble. In some cases of scratches, a form of mold has been found that has been thought to cause the disease.

There is inflammation of the glands of the skin, the parts itch, and the hair stands erect. There is also a sticky discharge that adheres to the hair like dew; at first, the fluid is thin and colorless, but later it is gummy and may have a fœtid odor. Transverse cracks appear in the skin, usually under the fetlock, but sometimes above it; the legs swell, the fetlock and pastern joints become stiff, and the horse is often lame on starting, owing to the soreness of the skin. In severe cases, a fungus-like growth of proud flesh, called "grapes," forms on the edges of the cracks, and the parts bleed easily and profusely.

The first essential is to clean the part. This is best done by clipping the hair close to the skin and applying a warm poultice of scalded bran, linseed meal, or bread and milk; this should be applied from twelve to twenty-four hours, and changed at least twice a day. When the poultice is removed, the part must be thoroughly washed, and wiped dry, after all scabs, etc., are removed. Antiseptics should be applied, either in solution or dusted on as a fine powder. White lotion, or one ounce of copper sulfate dissolved in one pint of water, iodoform, acetanilid, or

boric acid, dusted into the sores, are all excellent for scratches. After applying the antiseptics, the part should be covered with some bland oily dressing, such as olive, raw linseed, or castor oil, fresh lard, vaseline, or glycerin. A solution of one part of carbolic acid to twenty parts of glycerin or raw linseed oil is very good. The stable should be kept clean and dry. When the horse is worked, the sore parts should be oiled or greased at least twice a day. When the parts are washed, they should be wiped dry and oiled, to keep the skin from chapping and cracking.

In old, chronic cases, or when proud flesh or "grapes" have formed, after the part has been poulticed, the "grapes" should be cauterized with a stick of lunar caustic, or "butter of antimony," applied lightly with a swab, or tincture of iodin may be applied once daily for a few days. Then treat as a simple case.

FOULS IN CATTLE

Fouls is an inflammation, often associated with suppuration, of the skin and cellular tissues in the region of the toes of cattle. It usually occurs between the toes of the hind feet, or just above the toes ; but it is sometimes found in the front feet.

Fouls is thought to be caused by certain germs or bacteria which invade the tissues in this region. Standing in manure or filth, and running in muddy yards, are the most common causes, although injuries to the feet may bring on the disease.

There is inflammation, soreness, swelling and lameness. The toes spread apart, and the animal lies down more than usual, to relieve the feet. A small abscess may form, and a "core" slough out. In most cases, the tissues crack in the cleft between the toes, and a chronic indolent sore results that is difficult to heal. Chronic cases are liable to recur after they are apparently healed.

Poultice for twelve hours, clean thoroughly and keep clean and dry. In recent cases, the cleft may be cleaned by drawing a rope through it. Then apply a liquid antiseptic: white lotion, a five per cent solution of carbolic acid, or copper sulfate (blue vitriol) one ounce to a pint of water. Pure turpentine is also good. Following the antiseptic, powdered air-slaked lime, or calomel, may be dusted into the cleft to dry up the discharge. In severe and chronic cases, it is necessary to burn out the sore with a stick of lunar caustic or chlorid ("butter") of antimony applied with a swab after poulticing. Then treat as a recent case.

TUMORS OF THE SKIN

Warts are tumors of the skin. They may be found on any of the domestic animals, but are most frequent on horses and cattle. Their cause is not known, although an abnormal nutrition of the skin is the common explanation.

In their early stages, warts can be destroyed by a solution of pure acetic acid, applying it drop by drop until the wart is saturated and soft. In a week or

ten days the wart comes off. If it has not been removed by the "roots," another application should be made. If warts are large, the best way is to cut them out with a knife ; should they bleed profusely, the severed blood-vessels may be seared with a hot iron. Another good method is to tie a stout string firmly around the base of the wart, which will then soon slough off. Warts should be treated as soon as they are noticed.

MELANOTIC TUMORS

These tumors occur in gray, roan, or white horses. They contain much black pigment or coloring material. They are usually found in the region of the anus, between the thighs or about the sheath. They occur as single tumors or in numbers, and often attain a large size. They should be cut out with a knife, care being taken to use proper antiseptic methods.

CANCERS

Cancers are malignant tumors which become raw, ulcerated and angry-looking. They may occur on any part of the body, but are most frequent on the head and lower part of the legs. The best treatment is removal with the knife: in cases in which this cannot be done, they can be sloughed out by applying one dram of fluid extract of belladonna, mixed with sufficient white arsenic to make a paste. After sloughing has taken place, the sore should be treated as a simple wound. Cancers have already been discussed in Chapter VIII.

RUBBING THE MANE

Itching of the skin at the roots of the mane is a common annoying condition, and one that, in some cases, is difficult to cure. The skin in the affected region should be thoroughly cleaned with soap and water, then dried and an iodin ointment rubbed well into the skin. Give laxative food and Epsom salts (about four ounces) once daily until the bowels are loosened.

RUBBING THE TAIL

The causes for this trouble may be the same as for rubbing the mane, and the treatment is the same. It may also be caused by intestinal worms, especially pinworms. For treatment, see "Intestinal Worms," Chapter XII, page 341.

ERYSIPELAS

Erysipelas sometimes occurs in horses, but rarely in other animals. It is an inflammation of the skin, due to a specific germ that gains entrance through a wound, though the wound may be so small as to pass unnoticed.

The skin is hot, tender, swollen, and, if normally white, it turns very red. The inflammation and swelling affect the deeper tissues, which have a "doughy" feeling, pitting on pressure. There is a well-defined line between the healthy and the diseased parts. In severe cases there is a tendency toward the formation of a brownish, bad-smelling pus under the skin, and an extensive sloughing of diseased tissues.

The diseased parts should be wet frequently, or covered with a cloth wet with the following mixture: Tincture of chlorid of iron, one ounce; alcohol, one pint; or sugar of lead, one ounce, water, one pint. Also give internally every three hours: Tincture of chlorid of iron, four drams; water, one pint. Three times daily, give an ounce of hyposulfite of soda, dissolved in a pint of water. When pus forms, the cavity should be opened and washed out twice daily with a solution of corrosive sublimate (1 to 1,000 parts of water), or a 5 per cent solution of carbolic acid.

Erysipelas can be transmitted to other animals and to man by direct inoculation through a wound, or by infected instruments; but it is not contagious, in the proper sense of the term.

DISEASES OF THE EYE

The eyes of lower animals resemble those of man very closely, but the form of the pupil may give them a different appearance. In the horse, the pupil is oval and horizontal. In the cat, it is vertical. In the eye of a horse there are small, dark brown, or black, rounded masses of coloring-matter, commonly called "soot-balls," attached to the edge (most frequently the upper edge) of the pupil. At the inner corner of the eye, in horses and cattle, there is a thin fleshy membrane commonly called the "haw," that can be swept across the eye to remove foreign bodies. This membrane is best developed in those animals that cannot rub the eyes.

Sometimes the "haw" becomes inflamed and swollen, or partially drawn across the eye, as in tetanus or "lock-jaw." This condition is called "hooks" by some horsemen. The affected haw is sometimes cut out; the operation, however, is a cruel and useless one. Operations of the eyes should be performed only by a skilled surgeon.

Ectropium

Ectropium is a turning out of the eyelid, usually the lower one, so that it presents a red and irritated appearance. It sometimes occurs in horses and dogs. It is usually the result of severe inflammation, or an injury. When this condition is permanent, the only treatment is to remove a V-shaped piece from the lower lid, stitching together the parts so as to bring the lid up to its normal condition.

Diseases of the eyelids are not common among animals.

Simple Ophthalmia

This is a simple inflammation of the membranes covering the eye. It is usually the result of an injury, or of foreign bodies in the eye, such as lime from white-wash, chaff, or pollen.

The eye is red and irritated, often the lids are red and swollen, and there is a profuse discharge of tears, that run down the face. The blood-vessels on the surface of the eyeball are distended, and the membrane that supports them presents a bluish or milky appearance. Strong light irritates the eye.

Seek and remove the cause. Foreign bodies can often be removed by wiping the surface of the eyeball with a soft silk handkerchief. Lime should be washed out with an abundance of warm water. Then bathe the eye with cold water, apply cold cloths or bags of ice till the inflammation is reduced. If, however, inflammation should persist, bathing the eye with hot water three times daily for twenty minutes at a time is to be recommended. Following this, apply a few drops of a solution of boric acid, one dram in three ounces of water, twice daily with a dropper.

Periodic Ophthalmia, "Moon Blindness"

Moon blindness is a periodic inflammation of the deeper structures of the eye of horses. Its cause is not known, although it is generally believed to be produced by germs or parasites. It was formerly thought that the changes of the moon caused this disease, but this is wholly erroneous. Mares afflicted with it should not be bred, as the disease tends to be hereditary.

There is inflammation resembling simple ophthalmia, except that the surface of the eyeball is not so irritated; but the deeper structures are more clouded, there is a profuse discharge of tears, the lids are swollen and are kept partially closed to shield from the light, the eyeball is very sensitive and appears to bulge outward. The inflammation subsides in a week or two; the eye clears up, or nearly so; but there remains around the iris a slight yellow band, which

gradually becomes more marked. The attacks recur periodically, a few weeks or a few months apart.

The disease runs its course to total and permanent blindness. The blindness can be greatly delayed by careful treatment. During an attack, the horse should be placed in a darkened stall, and the same treatment given as for simple ophthalmia. In addition to this, iodid of potash, in one-dram doses, should be given internally as a drench once daily for four or five days, then withheld for an equal time, and repeated. Quinine, in dram doses twice daily, is also beneficial.

Catarrhal Conjunctivitis, "Pink-eye"

Pink-eye is a contagious inflammation of the conjunctiva (the transparent covering of the eyeball), attacking horses, especially toward the spring of the year. This disease affects the whole system, more particularly the mucous membranes. It is a sort of influenza. There is a tendency for pregnant mares afflicted with it to abort.

The eyes are red, with a thick, muco-purulent discharge. The appetite is slight, the bowels are constipated, and the temperature rises to 103° or 104°.

Isolate the horse and disinfect the stall with creolin, or a 5 per cent solution of carbolic acid. Blanket the animal and keep him warm and comfortable. Give gruels and mashes for nourishment, and to loosen the bowels; also give a heaping teaspoonful of nitrate of potash dissolved in water, twice daily, to stimulate the kidneys and reduce the fever. Bathe the eyes with hot water

three times daily for twenty minutes at a time, and drop in a solution of boric acid (one dram of acid to three ounces of clear water) after each application of hot water.

Worm in the Eye

In rare cases, the eyes of horses may be attacked by a small parasitic worm (*Fillaria papillosa*) that can be seen swimming in the chamber back of the pupil. If allowed to remain, it ultimately causes blindness. The only treatment is removal of the worm by a surgical operation, a small incision being made through the cornea.

CHAPTER XV

PARASITES

PARASITES are organisms, usually very small, that live either on the surface or within the body of a larger animal, called "the host," and gain their nourishment, directly or indirectly, at its expense. In some cases the parasites subsist on lifeless matter, but in other instances they secure their nourishment directly from the living tissues of the host.

Some parasites belong to the vegetable kingdom; for example, the mold-like fungi that cause "ringworm," or "barn itch," and a few other organisms of the surface of the skin, and some that live in the lungs or air-passages. Germs, or bacteria, are really minute plants, but diseases produced by these organisms are not ordinarily classed as parasitic. Many of them are classed with infectious and contagious diseases.

Most parasites (as the term is commonly used by veterinarians) belong to the animal kingdom, and they can be divided into two general classes: the insect-like (including, for convenience, ticks and mites, which are closely related to insects); and a large variety of other animals, most of which are properly classed as worms. As a rule, parasites do not spread from one species of animal to another, as from cattle to sheep, but there are some important exceptions to this.

Some species of these parasites pass only a part of

their life as parasites, the remainder of it being passed outside, and independent of, the host's body. Others exist only as parasites. Of the latter, some kinds pass their whole life from generation to generation in the same species of host; others spend a part of their lives as parasites in one species of host and require transfer to another species to complete their life-history. Some kinds, which do not ordinarily exist as parasites, become parasitic on accidentally entering the body of an animal. Parasites never originate spontaneously, but always come from parents which are like themselves at some stage in their life-history.

Very young and very old animals are more liable to attack by parasites than vigorous middle-aged ones. Any conditions that lessen the vigor of animals tend to increase their susceptibility to parasitic diseases. Filth, crowding large numbers of animals together, and, lack of sufficient food are the general predisposing agencies. The opposite conditions — clean quarters, clean skin, plenty of nourishing, laxative food, exercise and sunlight — are invaluable in preventing these diseases and in the successful treatment of them.

RINGWORM

Ringworm is a disease caused by a fungus that grows in the skin. It is usually seen in cattle, but it may occur in horses, dogs, cats, as well as in man himself. In cattle it is most frequent toward spring, after the animals have been confined in stables during the winter. It is often called "barn itch." The disease is not read-

ily transmitted from one species of animal to another, but under favorable conditions cross-inoculation may occur.

The disease is recognized by circular patches, varying in diameter from one-half inch to several inches, from which the hair has fallen. These patches usually occur about the head, neck or back. The skin from which the hair has fallen is slightly thickened and scaly. There is some itching of the affected part.

Painting the diseased area with tincture of iodine once daily for a few days will kill the parasite. Turpentine, kerosene, and a solution of one part of carbolic acid in twenty parts of oil are all excellent. The disease is of little significance and yields readily to treatment.

LICE

Lice are small wingless insects, of a dull white color, that live upon the surface of the body of many different animals. Each host harbors its own special louse. It is seldom that a species of louse that belongs to a certain species of animal will choose a host of a different species, but in some cases and under favorable conditions a transfer may occur. Chicken lice will attack horses and human beings. Lice are large enough to be seen easily by the naked eye, but they are often difficult to find on the hairy surface of the body, especially when they are few in number and are hidden in the dirt and debris of the skin. The only other parasites that may be mistaken for lice are the fleas, which are easily distinguished by their jumping habit; the

ticks, which fasten themselves to the skin; and the mites, which either burrow into the skin or live under crusts on the surface. Lice vary in size from minute white specks to some of the large bird lice, that may be one-third of an inch long.

The eggs of the lice, commonly called "nits," are small white ovoid bodies attached to the hairs or feathers. Lice are exceedingly prolific. It has been estimated that under favorable conditions a pair of the louse of the human head can produce at the third generation (in about twelve weeks' time) an aggregate of 125,000 individuals!

The first symptom of louse infestation is itching of the skin around the point of attack. On most animals, the pests first appear in the region of the neck. On cattle they are most frequently found along the back, and on pigs just back of the ears. Lice are not confined to any region, however, occurring on any part of the body that is protected by hair or feathers. Any irritation of the skin, such as sweating, increases the itching. To relieve this, animals rub themselves against convenient objects, lick or scratch themselves with the feet or horns, and, in the case of fowls, with the bill. Lice of the biting kind often produce small, irritated spots, like pimples, on the skin. A careful and thorough examination of the animal, in a good light, will reveal the insects, as well as the eggs or "nits" attached to the hairs. Animals suffering from lice usually present an unthrifty appearance, with ragged, dull hair or plumage, and dirty skin.

In treating lousy animals which are confined, the

quarters must be thoroughly cleaned and disinfected, and afterward given a coat of paint or whitewash that will fill all cracks. It is difficult to free animals from lice while in infested quarters.

When applying remedies to destroy lice, a second application should be made after five to eight days, to kill the young that may have hatched from eggs laid before the time of the first application. Acid solutions, such as vinegar, one pint to a quart of water, are excellent for destroying "nits." During treatment the infested animals should be well supplied with good food. For cattle, horses, sheep and pigs, salting frequently with a mixture of one part of sulfur to five parts of common salt is to be recommended. When animals are treated with a solution, in winter, it should be applied on warm days, or the animals kept in a warm place until they are dry.

In disinfecting quarters, all loose material, litter, etc., should be removed and burned. The quarters, rubbing-posts and other places likely to harbor the lice and "nits" must be thoroughly washed with a good disinfectant, such as a solution of one part of carbolic acid in twenty parts of water, and, when dry, whitewashed. Kerosene oil, a strong solution of lye, carbolic acid solutions and benzine are effective in destroying parasites about the quarters of infested animals. In using benzine, care must be taken to prevent fire by not bringing a flame into the quarters until the vapor has entirely disappeared.

Insect-powder is a good remedy to use on fowls, and on other animals when it is not practicable to employ a

solution. Fine dust, particularly that which contains much powdered air-slaked lime, is often effective in destroying lice on fowls; let the birds scratch in it. Air-slaked lime should be dusted into the corners and crevices of the quarters. Coal-tar applied hot to perches and walls, is very effective in keeping away house-mites of chickens.

Very hairy animals are best treated with solutions that destroy the lice outright. One of the best remedies is an alkaline coal-tar product which, when added to water, produces a permanent milky emulsion, that is very efficient in destroying parasites and does not injure nor irritate the animal. These coal-tar products are put on the market under various trade names, such as creolin, zenoleum, chloro-naphtholeum, sulfo-naphtholeum. They can be used in the proportion of one part of the medicine to fifty parts of water, or in bad cases one to thirty parts of water.

Another remedy that gives good results is an infusion of tobacco, two to three ounces boiled in a quart of water. This solution must be used sparingly, as it is likely to nauseate the animal.

Another good remedy is kerosene emulsion, which is made by dissolving one quart of soft soap or one-fourth pound of hard soap in two quarts of boiling water, and adding one pint of kerosene oil. By churning or pumping violently, then adding three quarts of water, the emulsion is made ready for use. Pure kerosene will usually take the hair off, and should not be used unless it is washed off at once.

Lathering small animals with tar soap or green

soap and warm, soft water and allowing it to remain for half an hour before washing off, is usually efficient. A solution made by boiling two ounces of stavesacre seeds in one quart of water is also excellent.

FLEAS

These insects can be easily recognized by their ability to jump. They are often found on cats and on long-haired (sometimes on short-haired) dogs. Any of the remedies for lice are efficient in destroying fleas. The quarters occupied by the infested animal should be disinfected.

SCAB OF SHEEP AND CATTLE

Scab in cattle, often called Texas- or range-itch, is found mostly among animals that are raised on the great plains of the West. The disease is caused by a very small itch mite, which lives on the surface and causes a scurfy and scabby condition of the skin, the mites living and reproducing under these scabs. The mites attacking cattle and sheep are different in kind, but they cannot be distinguished by the naked eye. The cattle mite does not attack other animals, except possibly temporarily, and then it does not reproduce. The same rule holds for the sheep mite.

If some of the scabs and crusts at the edge of an area affected with scab are removed, placed in a clean dry glass bottle and allowed to remain for a few hours, minute white specks, barely visible to the naked eye, can be seen moving on the inside of the glass; these

are the mites. If they are examined with a lens, their outlines can be seen.

Scab of Sheep
(*Psoroptes communis*, var. *ovis*)

At first, itching of the skin is shown by the animal's scratching with its hind feet, or biting and pulling wool. In bad cases, the wool may be shed over very large surfaces; but in ordinary cases the fleece has a ragged appearance and is wet and matted where the animal has bitten at it and pulled out tags of wool. The itching is more intense when the animals are warm with exercise. If the wool is parted over an itching spot and the skin examined closely, yellow pimples will be found which, on being pinched, exude a watery fluid. This fluid dries on the skin into yellowish, greasy scabs, which increase in area and thickness. These scabs are often torn off by the sheep, thus increasing the irritation.

An animal affected with scab falls away in flesh, becomes weak and debilitated, and presents an unthrifty, ragged appearance. The disease is most severe during the fall and winter months, when sheep are closely confined and are fed on dry food. In the large sheep-growing regions of the Southwest, scab is a common and very serious disease, causing heavy losses, not so much from the death of animals as from the general debility which it produces in large herds, and the consequent loss of flesh. The scab mites are transmitted by direct contact and by means of the tags and scabs scattered on the ground in yards and pens. Infested

stock-cars bring the disease to healthy animals. When sheep are closely confined in pens or feeding-yards the disease usually spreads rapidly.

As soon as a case of scab is observed, the whole flock should be dipped in some solution which will destroy the parasites. Excellent remedies are the coal-tar products recommended for lice (p. 317). They are used in the strength of one part of the coal-tar preparation to 50 or 75 parts of water. The dipping solution should be warmed to 110° F., and the sheep immersed for at least two minutes. During cold weather sheep should be dipped only on warm days and when well protected from cold.

One of the most effective dips for sheep scab, and the one that is probably used in the West more extensively than all others combined, is commonly called the "lime and sulfur dip." This dip is cheap and the ingredients can be easily obtained. The greatest objection to it is that the lime is somewhat injurious to the wool. The following is the formula :

Fresh quick-lime	8 pounds.
Sulfur	24 pounds.
Water	100 gallons.

The lime and sulfur should be carefully weighed and prepared as follows: Slake the lime to form a thick paste, sift in the flowers of sulfur and stir well; put this mixture in a kettle with twenty-five or thirty gallons of water and boil for one hour at least; two hours is better. The chocolate-looking mass is allowed to settle, the clear liquid is drawn off and water enough is added to make one hundred gallons. The ooze or sediment should not be used in the dip.

Dips are rendered more effective by adding a decoction of tobacco, about thirty pounds to 100 gallons of water.

It is better to avoid dips containing arsenic, which, being poisonous, must be used with great caution. The following directions from the Department of Agriculture cover the subject well:

"(1) Select a dip containing sulfur. If a prepared dip is used which does not contain sulfur, it is always safer to add about sixteen and one-half pounds of the sifted flowers of sulfur to every 100 gallons of water, especially if, after dipping, the sheep have to be returned to their old pastures.

"(2) Shear all the sheep at one time, and immediately after shearing confine them to one half the farm for two to four weeks. Many persons prefer to dip immediately after shearing.

"(3) At the end of this time, dip every sheep (and every goat, also, if there are any on the farm).

"(4) Ten days later, dip the entire flock the second time.

"(5) After the second dipping, place the flock on the portion of the farm from which they have been excluded during the previous four or five weeks.

"(6) Keep each sheep in the dip for two minutes by the watch; do not guess at the time, and duck its head at least once.

"(7) Be careful in dipping rams, as they are more likely to be overcome in the dip than the ewes."

When any number of sheep are to be treated, special dipping vats, constructed with draining pens, will be

found to be most economical. The vats should be fifty feet long and so arranged that the temperature can be maintained by steam admitted at the bottom.

The dipping of sheep should be repeated within ten days (preferably about a week), in order to destroy mites which hatch after the first dipping. Dipping sheep destroys not only the scab mite, but also sheep ticks (page 338) and other parasites of the skin. Scabby sheep should be carefully fed and cared for, and no healthy sheep allowed in contact with them or on ground that has been infested, until the disease has been eradicated and the premises disinfected.

Scab of Cattle

Cattle scab or itch is caused by a mite (*Psoroptes communis*, var. *bovis*) very closely resembling the mite of sheep scab. It occurs mostly in the great cattle-growing regions of the West, where it is known as Texas, range, or cattle itch.

Cattle itch does not cause apparent trouble during the grazing season; but when the cattle are on dry feed in winter, or when first turned on grass in early spring, the trouble exhibits itself, and may cause considerable loss. It is usually confined to young cattle, or to those out of condition. The first symptom is an intense itching of the skin, usually in the region of the neck and shoulders. The animals lick themselves, dig at the skin with their teeth or horns, rub against posts and other objects, sometimes even upon barbed wire, and often tearing the skin until it bleeds.

The itch gradually spreads along the back, sides, and down on the outside of the legs. It does not seem to occur on the inside of the legs, thighs, or the thin skin of the abdomen. In its early stages, the coat looks rough, the hair standing on end. The skin becomes scurfy, and, a gummy exudation from it forms a crust in the hair sometimes one-half an inch thick. The hair then comes off, or is rubbed from the badly affected areas, leaving bald patches of thickened, calloused and wrinkled skin. These patches often show first and most prominently on the top of the neck, which looks like the neck of an ox that has been calloused from wearing a yoke.

After the hair comes off, the parasites leave the part, the bald areas get well, and the hair starts to grow again. Animals suffering from this disease have a dejected and debilitated appearance, and fall away rapidly in flesh. They eat but little, and expend a considerable amount of time and energy in licking and scratching themselves.

The itch spreads quite rapidly through a bunch of cattle, especially if the general health of the animals is not good. Six or eight weeks after the introduction of an infested animal into a herd the disease is usually thoroughly disseminated. Thrifty, vigorous animals resist infestation much longer than others, and, when attacked, recover much more quickly under treatment than do unthrifty animals. The disease appears to spread by direct contact of the infested with healthy animals, the itch mites passing directly from one animal to another. It is also spread by means of posts, feed-

racks, mangers, against which contaminated animals have rubbed.

As soon as this disease is discovered, those animals which show no symptoms of it should be removed to ground or yards not previously occupied by cattle having the disease. If such arrangement is not possible, all affected animals should be separated from the healthy ones, and all posts, mangers, and feed-racks, against which infested animals have rubbed, should be thoroughly disinfected by scrubbing with a solution of one part of carbolic acid dissolved in twenty parts of water. Those animals which appear healthy should be carefully watched, and should symptoms of the disease appear the affected animals should be separated from the others at once. In short, every precaution should be taken to isolate the disorder, thereby reducing the extent of the attack.

The most successful medicinal treatment of cattle itch consists of a combination of external and internal remedies. The value of sulfur given internally in the treatment of parasitic diseases is well known. Sulfur is best administered in combination with salt, placed where animals can lick it at will. One pound of flowers of sulfur mixed with eight pounds of common salt is a good proportion. If cattle are not accustomed to eating salt, the quantity of this mixture should be limited to a small handful at first, and gradually increased. The external treatment consists in the application of remedies that will destroy the parasites and eggs without injuring the animal. If a large number of cattle are affected, the most satisfactory method is to

build a dipping vat, through which the animals must swim in the dip used to destroy the mites. The vat should be forty feet long. Efficient remedies used for external application are some of the coal-tar products, such as car-sul, chloro-naphtholeum, zenoleum, creolin, etc.; these are used in two and one-half per cent solutions with water, that is, one part of the medicine to forty parts of water. A very effective and cheap dip is composed of lime and sulfur in the following proportions :

Flowers of sulfur	24 pounds.
Unslaked lime	8 pounds.
Water	100 gallons.

Slake the lime to form a thick paste, sift in the flowers of sulfur, and stir well; put this mixture in a kettle with twenty-five or thirty gallons of water and boil for one hour at least; two hours is better. The chocolate-looking mass is allowed to settle, the clear liquid is drawn off and water enough is added to make one hundred gallons. All dips should be used warm, from 100° to 110° F. Animals should be kept in the dip about two minutes, or until the scabs are thoroughly saturated. A second dipping in about two weeks will kill any mites that may have hatched after the first dipping.

When only a few animals are affected, hand treatment can be resorted to, but it should be thoroughly done. The remedies can be applied with scrubbing-brushes, cloths or sponges, and all scabs and crusts should be thoroughly saturated. The remedy should be

applied warm, as in dipping. In dipping or hand treating, warm sunny days should be chosen, as the animal suffers less.

MANGE

Mange is a parasitic skin disease which may attack any of the domestic animals, and even man himself. It is caused by a mite closely resembling the scab mite, but which burrows into the skin, and is consequently difficult to deal with. Each domestic animal has its own species of mange mite. Mange is rarely seen except in dogs and cats.

There is intense itching, which causes the animal to scratch and rub the affected part. The skin is red and thickened, and covered with small pimples that exude a slightly amber-colored fluid that dries on the surface and collects dirt. The disease gradually spreads until the animal presents a most disagreeable appearance. Besides looking badly, the animal loses flesh and suffers greatly from the intense itching.

The animal should be isolated from others of the same species, and the hair covering the infected region should be clipped. Then apply green soap, which is allowed to remain for five hours. When it is washed off with warm water all scabs and scurf are removed. The parts should be wiped dry and one of the following remedies applied by rubbing it thoroughly into the diseased skin :

Formula No. 1 — Creolin . . . . . 1 ounce.
Oil of tar . . . . . 1 ounce.
Flowers of sulfur . . . . . 1 ounce.
Lard or vaseline . . . . . 8 ounces.

Mix all together and rub into the affected skin once daily for three or four days; then withhold for a week, and apply again.

Formula No. 2.—Crude petroleum, especially a variety that is known as "dynamo-oil," is excellent when combined with one part of sulfur to eight parts of oil.

Formula No. 3.—Turpentine and carbolic acid are excellent remedies, but they must be diluted with at least ten parts of oil, lard or vaseline, as they are too irritating when applied strong.

In treating cases of mange, the quarters are to be kept clean, dry and airy. It is well to disinfect and whitewash or paint them. No harness or other equipment or utensils should be used on a healthy animal without first disinfecting it by boiling for twenty minutes.

FLIES

It is difficult to estimate the losses that result from the attacks on domestic animals by the various kinds of flies, especially by those which gather about stables and yards where the animals are confined. These pests are rarely the direct cause of the death of an animal, but the continued irritation and worry result in loss of flesh in cows and in diminution of the milk flow, to say nothing of the annoyance to those who care for the stock.

The handling of these annoyances is preventive. In most cases, the adult fly deposits her eggs in manure heaps or other decomposing organic matter that re-

tains some moisture, and in a short time swarms of young flies emerge. The removal of such material prevents the breeding of the insects. It also removes a part of the food supply of the old insects. In many cases stables can be protected by fly-screens, or darkened so that the flies will not pester the inmates. Animals can also be well protected in some cases by the use of individual fly-nets. There are upon the market some excellent remedies which, when applied to the skin of the animal by means of a brush or spray, are offensive to flies and will protect the animal until the application evaporates.

A solution of one part of carbolic acid in twenty parts of water, or a solution of one part of creolin or similar coal-tar product to fifty parts of water, sprinkled about the stable, tends to keep the flies away, as well as to disinfect the stable.

MAGGOTS

Most of the maggots on animals are the larval or "grub" stage of the flesh-fly which swarms about dwellings and stables. The adult fly deposits the small, living larvæ on fresh meat, as well as on the surfaces of wounds, especially where the tissues have been injured to a considerable depth. It also deposits larvæ in the wool of sheep where it has collected manure and other filth and become matted. The larvæ may then work their way into the skin, causing extensive sores, which may result in the death of the animal.

There is considerable irritation, as shown by the ani-

mal's shaking or thrusting at the affected part. The diseased area appears lifeless and spongy; when opened, the living, wriggling parasites are found in the decomposing tissues. Infestation by maggots occurs only in warm weather.

Cleanliness is the first essential to treatment. Sheep with much wool should be "tagged" in early spring; that is, the wool should be trimmed away from the anal opening and vicinity, as well as from about the penis, so that there will be no opportunity for the wool to collect filth. This will usually prevent the difficulty in these regions. In case a wound has been attacked, the dead and diseased tissue, with as many of the parasites as possible and the surrounding hair and wool, should be carefully removed. Kerosene oil and turpentine are effective in destroying the parasites. Turpentine should not be used on a raw wound, nor about the anal opening, as it will cause too much irritation. A solution of carbolic acid (one part to twenty parts of water) is also good. After destroying the larvæ, the wound should be protected by tar, or by pure creolin or similar products. Axle-grease is also useful.

THE SCREW-FLY

In Texas and other southern regions, it is very common for wounds upon domestic animals to become infested by the larvæ of the screw-fly (*Compsomyia macellaria*). These larvæ are commonly called "screw-worms." The adult is a small, bluish green fly, with a brown head, and with three black stripes lengthwise

the thorax. The adult fly deposits its eggs on the surface of a wound. They hatch within a few hours, the larvæ (maggots) burrowing their way into the tissues, where they remain for about a week. Then they escape to the ground, pupate, and soon change into adult flies.

In some regions the screw-worms are a great pest, and cause serious loss to live stock. They attack an animal in even the smallest wound, such as the punctures made by ticks, wire cuts, brands, and the like.

The treatment recommended by Dr. Francis, of Texas, is to use pure creolin, or similar coal-tar product, in a machinist's oil-can, squirting it thoroughly into the wound. Oil of tar is also good. Fresh wounds can be protected by covering with tar.

THE HORN-FLY

The horn-fly is a small insect (*Hæmatobia serrata*) about half the size of the common house-fly, and of the same general shape. It was imported into America about 1887, and has spread over the whole country. It is a European insect. It causes considerable irritation to cattle, and a consequent loss of milk and flesh. The name comes from the fact that these flies collect in large numbers at the base of the horn to rest. They do not bother cattle when in this position, but bite them on the skin of the back, sides and flank.

Apply some substance to the surface of the animal's body to keep the flies away. A mixture of equal parts of pine-tar, kerosene and fish-oil is excellent. The tar is first "cut" by the kerosene, then the fish-oil is added.

This mixture is brushed over the surface of the hair as often as may be necessary. There are some excellent anti-fly remedies on the market that can be applied in a fine spray from an instrument made for that purpose. As the flies deposit their eggs in fresh manure, their reproduction can be stopped by spreading the manure where it will dry rapidly.

BOTS IN HORSES

Bots are the larval form of the bot-fly (*Gastrophilus equi*). The adult female is about the size of a honey-bee. She is frequently seen during the latter part of the summer flying about horses and depositing her small yellow eggs on the hair of the legs, breast and other parts of the body. When these eggs become moistened by the horse's biting them from the hair, they hatch, and the young larvæ make their way from the horse's mouth down his throat and attach themselves by two small hooks to the mucous lining of the stomach. Here they remain during the fall, winter and spring. In the early summer they loose their hold upon the stomach, pass out with the dung, burrow into the ground and pupate. The adult fly soon emerges and, after mating, deposits her eggs, and the life-cycle is complete.

The larvæ, or "bots" as they are commonly called, are frequently found by the hundreds attached to the walls of the stomach (Fig. 51); and yet practically no bad effects have been observed in living animals. It is possible that, in some instances, they may mechanically block the passage from the stomach into the intestines.

They may also cause some irritation in the stomach, but, so far, veterinarians have been unable to diagnose their presence or to attribute disease directly to them. There is a popular belief that bots may eat holes through a horse's stomach ; but this is not correct,

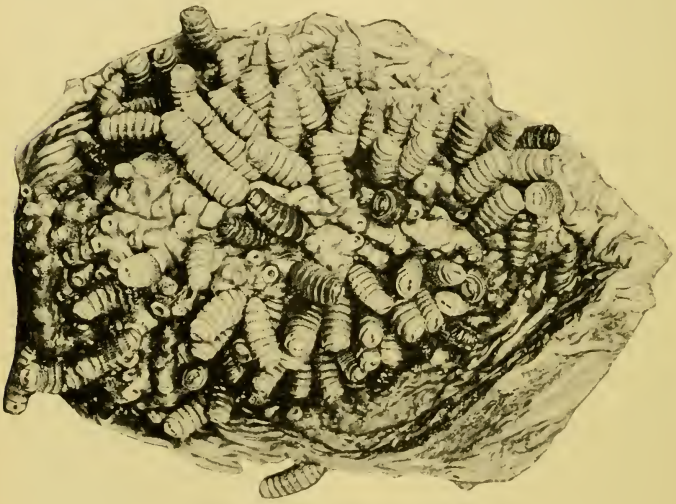

Fig. 51. Bots in horse's stomach

though it is possible that the irritation caused by the attachment of a bot may weaken the walls. When a horse dies, the gastric juice may digest the walls of the stomach, although this is rare. It may digest holes at the irritated places where bots have been attached. An amateur, in examining the stomach after death, might conclude readily, but erroneously, that the bots had eaten the holes.

There is no treatment known that will remove the bots ; they are extremely resistant to substances applied to their bodies. The writer placed a portion of a horse's stomach, with bots attached to it, in absolute alcohol, and found the bots alive and active six hours afterward. The only practical treatment is preventive, i. e., destroying the adult fly as soon as she is observed about horses, or scraping the eggs from the hair with a sharp-bladed knife once a week. This practice will prevent the eggs from hatching and the bots from getting into the horse's stomach. The giving of medicines internally to remove bots is useless.

BOTS IN CATTLE

There are two cattle bot-flies, or "warble-flies" as they are often called, that are closely related and resemble each other in appearance and life-history. Only one of these (*Hypoderma lineata*) is found in the United States; this one occurs most frequently in the southern parts, although it is generally distributed.

The adult of this species is about the size of the honey-bee. She deposits her eggs in summer on the skin of cattle in the region of the heel, causing the animal much discomfort. When the animal licks the part, the eggs are taken into the mouth, where they hatch ; and the larvæ, after remaining for some time in the esophagus, or gullet, finally work their way into the cellular tissue beneath the skin of the back. Here they remain and develop until early

spring, forming the lumps commonly known as "warbles." When fully developed, the larvæ, or "grubs," work their way out through small openings in the skin, drop to the ground, into which they burrow and pupate, finally emerging as adult flies.

These bot- or gad-flies of the ox cause much loss to the cattle industry, not only on account of the serious discomfort visited upon cattle by the adult fly in depositing her eggs, but also by the damage to hides due to the presence of the openings over the "warbles." "Grubby" hides are usually docked one-third in the market.

All adult bot-flies observed about cattle should be killed, and, from January on, every "warble" should be treated by applying turpentine to the small pore or opening directly over the lump. This will kill most of the warbles; the few that remain should be squeezed out and destroyed, each one so treated preventing the development of a fly. If this practice were generally and carefully followed, the fly could be exterminated. The adult flies do not travel far, so that a person, by this means, can largely rid his own cattle of this pest.

SHEEP BOT-FLY, "GRUB IN THE HEAD"

There is a small brown fly (*Œstrus ovis*), about the size of the common house-fly, which in the summer and fall is seen in swarms about flocks of sheep. It greatly annoys the animals by depositing living larvæ in the nostrils. To avoid these pestiferous flies, the sheep often stand with their noses close to the ground,

especially if the ground is dusty; they also collect in bunches with their heads together for protection. The larva, as soon as it is deposited in the nostril, makes its way up the nose into the sinuses or cavities connected with the nasal chambers, where it attaches itself to the mucous membrane by two small hooks. Here it remains until fully developed, when it loosens its hold and drops to the ground to pupate. Finally, an adult fly emerges.

While the larvæ, or grubs, are in the sinuses of the head, they cause great irritation. The animal snorts and blows the nose, and there is discharge of pus and mucus from the nostrils. The harm done by this pest is due to the annoyance and worry that it causes the sheep. The writer has never seen a case where death could be directly attributed to this fly. There is a disease due to another parasite, called "gid" or "sturdy," which is often confused with the sheep bot, that does cause death; but this pest seldom occurs in America. See page 340.

The best treatment consists in preventing the fly from depositing the larvæ in the nostrils of the sheep; this may be accomplished by keeping the sheep's nose well smeared with pine-tar. When there are but few sheep, the tar can be applied by catching the animals; when there are large numbers, salt is usually put in the bottom of V-shaped troughs, the sides of which are thoroughly smeared with tar. It is a good plan to apply tar once a week during the fly season. When sheep are seriously affected, they may be sent to the shambles. If valuable, a good surgeon should be employed to remove the parasites.

TICKS

Ticks and mites are closely related, to the spider tribes. They are not insects. Most of the ticks are only partially parasitic; that is, only a part of their lives is spent upon the bodies of other animals.

The most injurious parasitic tick is the southern cattle tick (*Boophilus annulatus*). Fig. 52. This creature is important, not only because of the losses resulting from its attacks, but also because it is the carrier of the germs of Texas or southern cattle fever from southern to susceptible northern cattle. The southern cattle tick is reddish or grayish in color; the adult female's body is about one-third of an inch in length, and resembles in shape a small castor bean. It attaches itself to the skin of cattle, particularly in the regions where it is thin, as between the thighs, on the belly, between the fore-legs and on the neck. The female, when fully developed and distended with blood and eggs, looses her hold on the animal, drops to the ground, and deposits a large number of eggs, which cover her body. The eggs hatch in from two to six weeks. The young ticks, crawling up on grass, are brushed off by grazing cattle. They crawl up the legs of the animals and attach themselves so firmly to the skin that they can be pulled off only with difficulty. The southern cattle ticks are found in all the southern states. They are more numerous in a brushy country than on the high, open prairies.

Fig. 52. Southern cattle tick, natural size. Upper one, female; lower, young.

Ticks are very resistant to efforts made to destroy them; it is with difficulty that they can be killed without injuring the animal to which they are attached. In case there are only a few, they can be scraped off with a knife-blade. When they occur in large numbers the most effective treatment is to dip the animal. In Australia, where the ravages of the tick cause serious loss, the following preparation, known as Christian's dip, is the most effective one known to-day. The formula for this dip, as recommended by Dr. Hunt, is as follows:

Arsenic	10 pounds
Soda	28 pounds
Soap	5 pounds
Stockholm tar	7½ pounds
Water	400 gallons

The arsenic, soda and soap are boiled together in a small quantity of water. The tar is then added; then the remainder of the water. Some persons boil the whole of the liquid in the dip, and by that means the tar is well mixed.

Although many experiments have been made and remedies devised in this country to remove ticks, none has so far proved perfectly effective in removing the danger of infection. Dipping-tanks containing water and certain kinds of crude petroleum called dynamo-oil afford the means for destroying many of them.

It should be remembered that the cattle get ticks from infested pastures, and that to prevent their having ticks or becoming reinfested after dipping, they should be kept from such pastures. The discussion of the Texas cattle fever itself will be found in Chapter XVI.

There are a number of species of ticks in the South that infest cattle and other animals, but this cattle tick is the most important. The sheep tick, so called, is not a tick, but a fly. It is of a reddish or grayish color, about one-fourth of an inch long. It is readily destroyed by any of the dips which are effective for scab.

LIVER FLUKES

Liver flukes (*Distoma hepaticum*) are small, flat, lance-shaped worms, varying in length from one-fourth to one-half an inch. The worm attacks cattle, sheep, goats and pigs. It is most frequently found in warm, moist climates and on low, wet lands where there is stagnant water. It usually attacks young animals. It causes heavy losses among sheep and calves in some countries. It has been estimated that a million sheep die annually from this disease. It is common in the southern part of the United States. An adult fluke, infesting the liver of an animal, lays a large number of eggs, which pass out with the dung and fall into water, where they soon hatch, and attack snails, passing one stage of their life-history as a parasite of this animal. From the snail, another free-swimming form of the parasite escapes, and infests drinking water. When these parasites are taken in by a susceptible animal they work their way to the liver and there become adult parasites.

In a few cases, in the early stages, an animal may die from apoplexy, caused by some of the parasites lodging in the brain; but in most cases the symptoms

appear gradually and increase in severity until the animal dies from general emaciation.

The first symptom noticed is that the animal is out of condition; the skin and mucous membranes are pale, the hair or wool is dry or rough, the appetite is lost, and the animal drinks large quantities of water. Dropsical swellings appear in dependent parts of the body. The bowels may be constipated or there may be profuse diarrhea. These symptoms become more aggravated until death takes place.

Microscopic examination of the discharges from the bowels will often reveal large numbers of the eggs. After death, the liver is found to contain diseased, yellowish nodules, each of which contains one of the flat, ovoid flukes.

The most satisfactory treatment is to prevent the disease by removing the animals to uninfested pastures, especially to those which are high and dry, and allowing them only pure fresh water. In the early stages of the trouble, an abundance of nutritious, easily-digested food will do much to assist in overcoming it. Salting the animals daily with a mixture of one part sulfur to six parts of common salt is also good. Medicines, except in the way of tonics, are of little value in the treatment of this disease.

BLOOD-WORMS OF THE HORSE

In the arteries which supply the intestines with blood there are frequently found dilations, or pouches, which are caused by the presence of small round worms

(*Sclerostoma armatum*). These worms frequently shut off the circulation of the blood to the intestines, and give rise to acute and violent colic that sooner or later causes the death of the animal.

There is no method of recognizing this disease before death, but it should be suspected in horses and mules that are subject to violent colic without apparent cause. After death, each dilation of the artery (aneurism) is found to be filled with small worms. There is no satisfactory treatment.

GID, OR STAGGERS, IN SHEEP

This disease, which is rare in America, is caused by the presence of a parasite in the brain. The parasite (*Cœnurus cerebralis*) is the cystic, or larval, form of a tapeworm (*Tœnia cœnurus*) which infests the dog, wolf and fox. The sheep become infested while pasturing or drinking where dogs and foxes have scattered the eggs of this tape-worm. After they are taken into the stomach, these eggs hatch, and the larvæ bore their way through the tissues until they reach the brain, where they form cysts about half an inch in diameter, filled with a watery fluid in which hang a large number of little balls, or knobs.

Lambs and young sheep are most liable to infection by these parasites. In the early stages, the animal appears dull, the head is carried in peculiar positions, turned to one side, upward, or drooped toward the ground. The animal has a tendency to walk in a circle, sometimes to the right and sometimes to the left; there

are convulsions and trembling of the muscles. The animal gradually becomes weaker, until it is unable to walk, and finally dies.

In rare cases, the larvæ have been removed surgically by cutting out a section of the skull-bone. But the only practical treatment is preventive. Sheep must be kept off infected pastures and away from dogs or other animals that scatter the infection. The heads of sheep dying from gid should be destroyed by boiling or burning, so that the cysts will not be eaten by dogs and spread the contamination.

INTESTINAL WORMS

The digestive tract is frequently infested with parasitic worms. These are found particularly in the stomach and intestines. They are common in the dog, cat, pig, horse and sheep, and occasionally are found in cattle. In most cases, intestinal worms gain their nourishment from the partially digested food, but some may live on blood, or pus or serum which exudes from irritated tissues to which the worm may be attached.

Intestinal and related worms may be divided into four classes: the flat, segmented, and usually long, tape-worm ; the flat, lance-shaped fluke-worms, found in the liver; the thorn-headed round-worms; and the common round-worms.

The tape-worms (Fig. 53) are usually long, often measuring many feet, but in some cases they may not be over a half inch in length. Part of their life-history is as follows: The adult worm infesting the intestine of the host

deposits eggs which pass out with the excrement. When these eggs are taken into another animal's system, either in the food or the water, they hatch into a minute, migratory, larval form, that bores its way through the tissues until it reaches some suitable place, often in the muscle, where it becomes encysted. These cysts are small, rounded, yellowish masses, containing the worm-like structure that is often visible to the naked eye. These cysts, when observed in the muscular tissue of pork, chicken, duck, etc., are commonly called "measles," and the meat is said to be "measly" (page 351). In fish, the encysted forms of worms found in the muscular tissue are commonly called "grubs," or "worms."

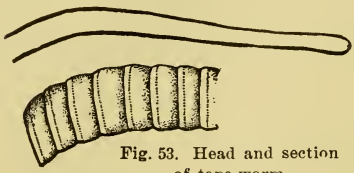

Fig. 53. Head and section of tape-worm.

The cycle of the round-worms found in the intestines is as follows: The egg deposited by the adult passes out with the excrement, and gets into the food or water which may be eaten by other animals In some instances, it is necessary that the egg be taken in by a certain animal, in which it undergoes a larval stage. In some worms, the young are brought forth alive. The life-history of the fringed tape-worm (*Tænia marginata*), which is frequently found infesting the livers and small intestines of sheep in the middle west, is unknown.

When an animal is badly infested with intestinal worms, some of the following symptoms are usually shown: The coat is likely to be rough and staring,

the appetite is usually capricious, and the animal does not appear to be in as good condition as the amount of food consumed would warrant. There is often itching about the anus, which causes the animal to rub against various obstacles, often wearing away the hair at the roots of the tail. The worms, or eggs, are usually passed with the dung, as a close examination with the lens may reveal. In horses, there is frequently a collection of a whitish-yellow substance close to the anal opening. In dogs and sheep, small, white, rectangular segments of the flat tape-worm can frequently be observed in the excrement. Owing to the habits of the animal, the pig and dog are most frequently attacked by intestinal worms. Sheep are frequently infested with tape-worms, derived from pastures or drinking places infected by dogs, especially by the dogs used in herding sheep. Young animals that are out of condition, or those fed largely on one kind of food, are more liable to attack by intestinal worms.

Preventive treatment is more satisfactory and economical than medicinal. Animals liable to attack should be kept in vigorous, thrifty condition by allowing them sufficient and suitable food in variety. Common salt should be supplied to the animals, but not mixed with the food. The quarters, as well as the food and water, should be kept clean and free from infestation and contamination. In many cases, if animals affected with worms are given a good variety and an abundance of nutritious, laxative food, with some tonic medicine, they recover their normal condition without further medicinal treatment.

The following tonic condition powders are excellent for horses:

Sulfate of iron, pulverized	4 ounces
Nitrate of potash, pulverized	2 ounces
Ginger root, pulverized	2 ounces
Gentian root, pulverized	2 ounces
Nux vomica seed, pulverized	2 ounces

Mix all together thoroughly, and give from a small to a heaping teaspoonful in the feed two or three times daily. A mixture of two parts by measure of common salt, two parts of wood ashes and one part of sulfur, mixed and placed where animals can have access to it, is excellent, not only as a preventive, but as treatment. Before giving medicines (vermifuges) for the purpose of killing or removing worms, the animal should be fed very sparingly for forty-eight hours. The medicine should be given on an empty stomach and followed by a brisk purgative to expel the worms from the intestines. Turpentine is an excellent remedy, in doses ranging from one dram for small animals to one to two ounces for the horse. The turpentine should always be well diluted, either with milk, olive oil, or raw linseed oil, so that it will not blister the mouth or throat. These doses should be given once daily, for two or three days, and followed by a good purgative.

For tape-worms in sheep and lambs, koosoo in doses of two to three grains given in two ounces of castor oil is excellent; as is also ethereal extract of male-shield fern in one dram doses combined with four ounces of castor oil. All vermifuges should be given

after the animal has fasted. Animals to be treated should be confined in a yard until after the worms have been expelled, and no uninfested animals should be allowed on the ground until it has been thoroughly disinfected. It is seldom advisable to treat very weak and debilitated lambs. When the whole of the tape-worm has been expelled, the small, tapering head-end of the worm can be found in the discharges if a careful examination is made. The upper drawing in Fig. 53 shows the general appearance of the head of a tape-worm.

For tape-worms in dogs, give pulverized areca nut, about two grains for every pound weight; or the ethereal extract of male-shield fern, in one-half dram doses combined with an ounce of castor oil, for average sized dog. An excellent remedy for all intestinal worms in dogs, and especially the round-worms, is a mixture of

Turpentine	1 part
Pine-tar	8 parts
Raw linseed oil	8 parts

The tar should be "cut" with the turpentine and then thoroughly mixed with the oil. The dose is from one to four ounces, depending on the size and age of the animal. It is to be given on an empty stomach, after the animal has fasted from eighteen to twenty-four hours. Food and water are to be withheld for four to six hours after the medicine has been given.

In giving medicines containing oil, great care must be taken to prevent choking. Small animals should be

placed on the rump, and held between the knees, while the medicine is slowly given; if it is offered while the animal is in a standing position, with the head raised, the patient is unable to swallow. When strangled or choked by oily medicines, animals stagger or fall, as if intoxicated, "gagging," coughing, and breathing with great difficulty. They may die from suffocation, or from pneumonia, which is liable to follow choking.

STOMACH-WORM OF SHEEP *

In some of the central states, serious losses among lambs result from the invasion of the fourth stomach, or abomasum, by a parasite, commonly called the "twisted strongyle" (*Strongylus contortus*). It is most frequent in wet seasons, and on low, marshy pastures; but after the locality is once well infested the disease will be found on high pastures, in those regions where there is abundant rainfall and the air is moist.

The life-history of the parasite is not well known. The eggs are passed with the dung, and hatch after falling in moist places. In this manner, probably, they come to infest pastures and drinking places. It is rare that sheep confined in barns and similar dry places become infested.

The disease usually affects young lambs, although adult sheep may suffer with it occasionally. Old sheep are likely to resist the disease. The animal falls away in flesh, becomes weak and debilitated, and has a dull, dejected appearance. It eats but little, and shows a

* See an excellent account in Bulletin No. 117, Ohio Expt. Station.

depraved appetite, craving dirt, dung and litter. The eye is dull, the mucous membranes pale, and the wool lacks luster. A profuse diarrhea finally sets in, which is usually fatal.

On opening the animal after death and very carefully examining the contents of the fourth stomach, that lies just back of the "manifolds," a large number of small round worms, white or reddish brown in color and about one inch long, will be found attached to the walls of the stomach or twisted together in bunches. Unless one is familiar with them, they are likely to be overlooked, especially if there is much food in the stomach ; but, by washing the contents away carefully and examining closely, the parasites can be found.

Healthy lambs should be removed from those showing signs of this disease, placed on high, dry pastures, and allowed to drink only pure, uninfested water. Gasoline is one of the best remedies for this disorder. One tablespoonful, shaken up in four ounces of sweet milk, is a dose for a lamb weighing from sixty to one hundred pounds. The lamb should fast from the evening before until ten o'clock in the morning, when the medicine is given, and no food or drink allowed for three hours thereafter. This treatment is to be repeated for three days in succession, and again in a week or ten days, if there is no improvement. Unless the animal is much better, it is a good plan to repeat the treatment. Be sure to put the lamb on his rump while drenching, and do not tip the head back, or it will strangle. The Ohio Experiment Station found the above to be the best treatment for this disease.

In this, as in all other parasitic diseases, preventive treatment is the better and more economical. Sheep and lambs should be kept from infested pastures, and (in localities where the disease prevails) away from low, wet lands and stagnant water. As lambs acquire the parasite from the pasture or the drinking place, they do not contract the disease if they are kept housed.

LUNG-WORM

Lambs, pigs and calves are the animals most frequently attacked by this parasite (*Stronylus filaria*), although adults may be affected. It is seldom found in other species of animals. There are several kinds of worms that may attack the lungs, but the one mentioned is most frequent, and does the most damage. It is closely related to the stomach-worm of the sheep. The young animals usually contract the disease from infested pastures, drinking places, troughs or pools of stagnant water.

The animals fall away in flesh and present an unthrifty appearance. They are subject to violent fits of coughing and strangling, often raising frothy mucus, which contains the small white thread-like worms, from one-half inch to one inch in length. The coughing increases and the debility becomes more marked until the animal dies. Usually there is difficult breathing, which is most marked when the animal is coughing, or directly afterwards.

If the animal is fat and in good condition, it is often the most economical plan to sell it to the butcher.

All well animals should be separated from the sick ones and put on uninfested ground or quarters. There are two plans of treatment. One is to place the infested animals in a close room or tent and fumigate with sulfur by sprinkling it on live coals. The attendant should stay with the animals, keeping his head on the same level as theirs until he can stand the fumes no longer. Then admit fresh air. This treatment should be given once daily for three or four days.

Another treatment, which is more satisfactory, is to inject medicine into the trachea, or windpipe, by means of a hypodermic syringe. A mixture of one part of turpentine in two parts of olive oil is very good. Another remedy is:

Carbolic acid	½ ounce
Turpentine	4 ounces
Olive oil	8 ounces

Whichever of these remedies is used, the ingredients must be thoroughly mixed, and from one to three teaspoonfuls injected into the trachea once a day for three days. The animal must be placed on his rump and held between the knees while the hypodermic needle is inserted into the trachea two or three inches below the throat, and the medicine gradually injected. In treating animals affected with this or similar parasitic diseases, the animals are to be well fed, as soon as the medicinal treatment has been completed, with plenty of nourishing food. To build up the system is to assist nature in overcoming the disease. As a general rule,

parasites and contagious diseases attack weak, debilitated animals in preference to vigorous, healthy ones.

GAPES IN FOWLS

Gapes in chickens is due to the presence of a small round-worm (*Syngamus trachealis*) in the trachea, or wind-pipe. The female worm is about one-half an inch long; the male, which is attached to the female, is less than half as long. When the worms are found in the trachea they are attached to the mucous membrane, from which they obtain the blood that nourishes them. After being detached, the male presents the appearance of a smaller worm growing or branching from the larger.

The worms are usually found in young, weak chickens, but in some cases they attack strong birds. The chickens contract the disease from food or water containing the eggs, or "catch" it from diseased chickens. It is said that angle worms from infested ground often harbor the eggs or the young worms, and that when these "foster parents" are fed to healthy chickens they will transmit the disease.

One of the first symptoms is sneezing, followed by gaping and attempts to get rid of the worm in the windpipe. In case there are many worms, or the swelling and inflammation of the throat is severe, there is often difficulty in breathing. If the irritation of the throat continues, the chick becomes dull, weak and stupid, and finally dies from exhaustion or suffocation. The gaping is so characteristic of this disease that there is no difficulty in recognizing it.

The best treatment is to destroy the chick as soon as the disease is noticed and burn the body, thus preventing the spread of the disorder. If possible, shift all healthy chicks to uninfested ground, but if this is not practicable, the quarters should be thoroughly cleaned and disinfected. If care is taken to detect and remove the first case of the gapes as soon as it is discovered, there is little danger of its spread.

In some cases, the worms can be removed from the trachea by using a feather,—stripping the vane till only a small tip remains at the end, and inserting this, wet with kerosene or turpentine, into the chick's trachea when he breathes. If carefully given a few turns, it will loosen the worms, and then they can be removed. After a little experience, a number of worms can be removed by this means. They should be destroyed, and the chick, after this treatment, should be isolated until all danger is past.

MEASLES IN MEAT

"Measles" in meat is due to the presence of small, yellowish spots scattered through the tissue (page 342). These yellow spots are the encysted stage of some kind of tape-worm, and, if taken into the human system without being killed by cooking, they will probably develop into adult tape-worms. The measles, or cysts, are found in the meat of the pig, ox, duck, chicken, dog, cat, and rarely the sheep. They are most numerous in the deeper muscle of the shoulder, back and neck, but they may be scattered all over the body. Measly meat should

not be used for food, nor placed where animals can eat it, unless it has been thoroughly cooked to kill the parasites.

TRICHINÆ IN MEAT

Trichinosis is a disease especially of pigs and man, caused by the invasion of the tissues of the body by a minute round-worm (*Trichina spiralis*), that bores its way to the different parts of the body, and then becomes encysted. Fig. 54. Man usually contracts the disease by eating infested pork that has not been thoroughly cooked. Trichinæ in pork are invisible to the naked eye. When taken into the stomach, the encysted worm is liberated, develops into an adult, and the females give birth to large numbers (ten to fifteen thousand) of embryo young. These young worms migrate, boring their way, or carried by the blood and lymph, to distant parts of the body, there developing the cyst stage. When these cysts are examined under a microscope, each is found to contain the small, cylindrical embryo worm, in a coiled or spiral position, from which it takes its Latin name.

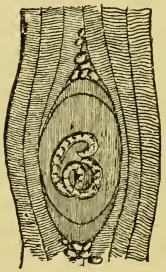

Fig. 54. Trichina spiralis encysted in lean meat. Magnified.

When meat infested with trichinæ is eaten, there follows, in the human subject, considerable irritation of the bowels, associated with diarrhea. This occurs in three to ten days after the meat has been eaten. During this period, the worms are multiplying in the digestive tract of the patient. Following this, there is

severe soreness of the muscles, associated with fever. During this stage, the young trichinæ are migrating, working their way through the tissues of the body. In general, it has been said that the symptoms of trichinosis in man are those of "rheumatism, associated with typhoid fever." The disease has never been recognized by any symptoms shown by pigs. Pigs do not die of trichinosis. The worms can be found in the muscular tissue by making a microscopical examination. In examining the carcasses of pigs for trichinæ, specimens of lean meat should be taken from the deeper muscles of the neck, inner face of the shoulder, "midriff" or diaphragm, tenderloin, or the base of the tongue, as the parasites are most frequent in these regions. Estimates as to the prevalence of trichinosis in pigs varies from two to ten per cent. Pigs that are kept in unsanitary or filthy quarters and fed upon offal are more frequently diseased. There is no remedy. Pork or ham should never be eaten without a most thorough cooking.

CHAPTER XVI

CONTAGIOUS AND INFECTIOUS DISEASES

CONTAGIOUS and infectious diseases are those that are capable of transmission from one animal to another of the same species. In some cases they may even be transmitted to animals of another species, either by direct contact, or through some medium which has been infected by a sick animal. A contagious disease, as commonly understood, is one that is "catching"; that is, a well animal may contract it without coming into actual contact with the diseased animal. It "goes in the air." An infectious disease is contracted only when the animal comes into contact with the diseased subject or with some of its excretions. Amongst diseases of the human subject, scarlet fever may be cited as an example of a contagious disease, and typhoid fever of an infectious one. Strictly speaking, however, it is difficult to draw a distinct line between them, and there is now a tendency to use the term "transmissible" rather than either of them.

In many of the diseases of animals, the germ that causes the particular disorder has been discovered, and its nature is definitely known. Most of these germs are microscopic living cells belonging to the lowest order of plants. In a few diseases, the germ that causes the trouble belongs to the lowest order in the animal kingdom.

Vegetable germs are known generally as bacteria or microbes. In many cases they cause disease by throwing off, as they multiply and grow in the attacked animal, a definite poisonous chemical substance called a "toxin." If this toxin exists in sufficient amount and is not neutralized, the animal dies from its poisoning. In many such diseases, as soon as the germs begin to throw off the poison, certain cells of the animal's body begin to manufacture a chemical substance that neutralizes the poison made by the bacteria; this substance is called an "antitoxin." If the cells of the body are strong and active, they usually form enough antitoxin to overcome the toxin made by the germs, and the animal recovers. The power of resistance to a disease is called "immunity." Some animals are naturally immune; that is, they do not contract the disease when they are exposed to it. After an animal has had the disease, or has been vaccinated, it often acquires immunity.

Whenever a large number of animals are gathered together, the danger from contagious diseases is greatly increased, and extra precaution in the way of hygiene and sanitation must be observed. Anything that weakens an animal's system or lowers vitality predisposes that animal to attacks, especially by contagious diseases. Dark, damp, filthy, and poorly ventilated quarters, and a lack of proper nourishment, tend to produce disease; while light, dry, well ventilated quarters, where the animals are well nourished and have sufficient exercise, minimize danger from disease. Direct sunlight is a destroyer of many disease germs.

When an outbreak of a transmissible disease occurs among animals, the well ones should be removed from the sick and placed in uninfected quarters. Well animals should never be left in infected stables and yards. Medicinal treatment in most contagious diseases is of little value. Vaccination or inoculation against them is very effective in some cases, and the use of antitoxin, or blood serum, from immune animals, gives excellent results in others. Some kinds of antitoxins are now to be had as laboratory products.

In treating animals sick with a transmissible disease, every effort should be directed toward making the subject comfortable and keeping up the strength, which will enable it to overcome the disease. In guarding against such diseases, quarantining is the most effective method. Animals suffering from a contagious disease readily infect others, either by direct contact, or indirectly by means of infecting quarters, pastures, drinking places, food or other materials. In adding new stock to herds, precautions should always be taken to prevent the introduction of disease.

GLANDERS AND FARCY

Glanders and farcy are the same disease, farcy being the form which attacks the skin. Glanders is a malignant, infectious disease, caused by a germ (*Bacillus mallei*) that attacks horses, mules and asses. It can be transmitted to other animals by inoculation, but it rarely occurs except in man, who may become inoculated from glandered horses. The virus, or germ, of glan-

ders does not float through the air, but is transmitted by direct contact, or by means of watering-troughs, feed-boxes, hitching-posts, equipment or utensils that have been contaminated by a diseased animal. The discharge from the nose of a glandered animal contains the germs in large numbers, and wherever this discharge is scattered it is liable to infect other animals. Perhaps the disease is sometimes transmitted by means of flies.

Glanders may occur in the chronic form or the acute form, or it may attack the skin in the form of farcy. In the early stages, and especially in the chronic form, glanders is difficult to diagnose on account of its insidious nature. To an ordinary observer, the horse appears but slightly ailing, and yet he may be badly diseased and a dangerous source of infection.

The symptom usually noticed first is a slight sticky discharge from one or both nostrils, thin and colorless. As it dries about one nostril, it gives the nostril the appearance of being smaller than the other. As the disease progresses, the discharge becomes thicker, resembling raw linseed-oil ; later, it becomes yellowish and often streaked with blood. The discharge is more profuse when the animal is exercised, or when the head is lowered to drink or to eat. There is a popular idea among horsemen that if the discharge from the horse's nose sinks in water it is glanders, while if it floats it is not glanders ; but this is not to be relied on as a test. Raw, ragged ulcers, with depressed centers and reddish edges, appear on the mucous membrane lining the nostrils, and especially on the septum, or partition

between the nostrils, and in the false nostril. In bad cases, these ulcers may perforate or "eat through" the septum. The mucous membrane, instead of being a healthy rose-pink, becomes a dull lead or dusky slate color. The lymphatic glands under the jaw and between the jaw-bones enlarge, are often tender, and are usually adherent to the adjacent tissues, or "grown fast to the bone," as it is commonly expressed. These glands rarely gather and break, as they do in distemper. When they do suppurate, as in bad cases of glanders, they are difficult to heal. As glanders progresses, the horse gets "out of condition," the coat "stares," and there is a general debilitated appearance. There is often a profuse discharge of water-like urine. Horses with chronic cases of glanders may live and work for years without showing serious symptoms of the disease; but all the time they are scattering the germs of the disease, and, without exciting suspicion, often causing the death of many other horses.

In farcy, the germs of glanders attack the skin and lymphatic glands. This disease is most frequently seen in the region of the hind legs, and first appears as a small firm bunch, or several bunches, in the skin. These may attain the size of a hickory nut, and after a time may break and discharge an amber fluid mixed with pus, that dries about the sore. These bunches, or sores, commonly called "farcy buds," are difficult to heal. They often spread and become large raw sores. The glands on the inside of the hind legs, together with the ducts connecting them, enlarge and become tender, and the hind legs swell. Farcy may run into

glanders and a horse may have both forms of the disease at once. When horses are closely confined or are in close contact with others, glanders spreads quite rapidly, especially if there are debilitating influences, as on shipboard or in army service. In other cases, a glandered horse may work with a mate for some time without communicating the disease.

When an animal is suspected of glanders or farcy, it should be isolated and carefully cared for, to prevent the infection of persons or other animals. The horse should be quarantined and the development of the disease very closely watched; the animal may be tested with mallein, which is a toxin similar to tuberculin, a rise of temperature, following the injection, indicating the presence of glanders. Mallein affords an excellent means of diagnosing the disease, and it has no bad effects, except some swelling that may follow at the point of injection. Inoculating a male Guinea-pig with the virus obtained from the discharge from a suspected animal causes swelling of the testicles of the pig and an angry sore at the point of inoculation, if the disease is glanders.

Glanders is practically an incurable disease, and an animal should be killed and the carcass burned or buried deeply as soon as the danger is recognized. The quarters where the animal has been should be thoroughly disinfected, by removing and burning all dirt, litter, etc., and applying a solution of corrosive sublimate (one part to five hundred of water) or some equally strong antiseptic to the floor, mangers, partitions and feed-boxes. When this has dried, a good coat of

white-wash or paint should be applied. All equipment that has been in contact with the animal should be burned, or disinfected by boiling for one hour. All persons who may come in contact with a glandered animal should exercise the utmost caution, to prevent contracting the disease through sore places on the hands or by rubbing the eyes or nose, as the disease is fatal and extremely loathsome.

Most states have stringent laws for protection against this disease, and in some states a small price is paid for diseased animals condemned by the proper authorities. In nearly all states, there are heavy penalties imposed on persons convicted of disposing of glandered animals.

ANTHRAX, CHARBON

Anthrax, or charbon, is a malignant infectious disease attacking all domestic animals, and man himself, when he is infected from animals. Anthrax is not very common in the northeastern states, but in some parts of the west, and much more commonly in the south, it causes serious losses in cattle, sheep, and mules. In some parts of Europe, also, severe losses result from it. The disease is likely to occur in the vicinity of tanneries, the infection being brought in with hides; or in localities where the disease has existed before, and the infection still remains; or where it has been scattered from infected localities, either by diseased animals, or contaminated materials, that may be carried by dogs or other animals, or washed by streams. An-

thrax is caused by the anthrax bacillus, a slender rod-shaped germ that can easily be found by making a microscopical examination of the blood or tissues of a diseased animal. In stab cultures in agar or gelatine the anthrax germs grow readily in peculiar "frost crystal" colonies.

Anthrax occurs most frequently in cattle, sheep and mules. The symptoms vary greatly. In some cases there is an absence of definite symptoms, the animal dying very suddenly, with few or no premonitory warnings. This is often called the "apoplectic" form. Other cases show a high fever with delirium, or severe straining associated with discharges of bloody mucus from the bowels or other natural openings of the body. The mucous membranes are bluish in color, and there is great weakness and postration, as shown by the trembling of the muscles. There are often boils or pustules on various parts of the body filled with a dark red fluid. Frequently there are dropsical swellings on the body, with oozing of bloody fluid through the skin. In man, anthrax is sometimes called "malignant pustule," because it appears as a sore on the face, and "wool sorters' disease," because it is sometimes contracted from infected wool.

After death, bloody or hemorrhagic spots are found in the muscles and internal organs, the spleen is greatly enlarged, the blood is dark, thick and muddy in appearance, the veins are distended with dark blood, and there are bloody fluids escaping from the openings of the body. Anthrax can be diagnosed by examining the blood and other tissues microscopically for germs

of the disease, by making artificial cultures on agar or gelatine, or by inoculating a small animal.

Treatment in a medicinal way is of little or no value. A vaccine has been discovered that is very effective in preventing the disease. This is used extensively and successfully in the localities where the disease occurs, both in this country and in Europe. It can be purchased on the market. Great care should be taken to prevent the spread of the disease. All contaminated materials should be burned, quarters disinfected as recommended for glanders, and a stringent quarantine maintained about infected localities. Infected pastures are to be avoided, as well as streams along which animals have died. Persons coming in contact with animals affected with anthrax should be careful, as the disease is very dangerous. The mortality among animals during an outbreak is usually very high. Whenever a contagious disease occurs that attacks various domestic animals and causes death, anthrax should be suspected, and skilled advice should be called.

BLACKLEG

This disease is also called "black quarter" and "quarter ill," and is sometimes described under the name of "symptomatic anthrax," but it has no relation to true anthrax. Blackleg is a disease of young cattle, attacking them from calves a few weeks old to cattle two and sometimes three years old. The disorder is caused by a germ that the cattle get in pasture, or in food or drinking water. The disease is distributed over a

large part of this country, and causes serious losses in the central and western stock-raising states.

Calves that are in good condition, or fat, are more likely to contract the disease than those in thin flesh. In some countries, the disease is said to be confined to low-lying pastures; but in the western states it is quite as frequent on the high, dry prairies as on lower lands. It is thought that the germ of the disease does not belong naturally within the animal body; but, taken into the bodies of young cattle, it finds conditions favorable for multiplying, and produces the disease. Blackleg may develop on pastures and in localities where it has never been known before, and where there seems to be no possibility of the germs having been introduced.

The affected calf is first noticed lying down apart from the others. If driven up, it is found to be stiff and lame in one leg, or one whole side of the body may be almost useless. There are swellings on some part of the affected leg or side, which, if rubbed firmly with the hand, will be found to be filled with gas and will emit a crackling sound. This is a characteristic symptom of this disease. Calves with blackleg will usually live for some days; only a few recover.

Well calves should be removed to uninfected pastures or quarters, and given water that has not been contaminated. Medicinal treatment is of little value. Exercise and purging with salts are recommended, the latter being given as a drench in one-half to one pound doses. All susceptible animals should be vaccinated with blackleg virus—a safe and reliable preventive. In

regions where this disease prevails, calves should be vaccinated before the trouble occurs.

Directions for Using Blackleg Vaccine

Blackleg vaccine is made from diseased flesh taken from a calf that has died from blackleg. This is cut into thin strips and dried at a temperature of about 100° Fahr. It is then ground into fine powder and weakened by heating. Two forms of vaccine are prepared: the "single vaccine," which requires but one injection or application; and the "double vaccine," which requires two injections about ten days apart.

The first, or weakest, of the double vaccine is heated for six hours at a temperature of 210° to 212° Fahr. This first vaccine is intended to prepare the animal's system for the second dose, which is very much stronger. The second vaccine is prepared by heating it for six hours at a temperature of 167° to 169° Fahr.

The single vaccine is of medium strength, and requires but a single application. This is made ready by heating the virus for six hours at 197° Fahr. The double vaccine is safer to use and gives better protection than the single, and is generally to be recommended, the only objection being that it requires handling the cattle twice. Single vaccine should not be used on animals that are very fat, as they are especially susceptible to blackleg. In case blackleg has already broken out in a bunch of young cattle, the single vaccine is usually recommended.

Vaccine is also prepared in the form of a little pill,

or a piece of string saturated with the material; either of which is to be inserted beneath the skin with special instruments made for the purpose. The powdered vaccine, which is the kind generally used, requires to be mixed with water, filtered, and injected beneath the skin by means of a hypodermic syringe. Fig. 55. The powdered vaccine is put up in little ten- and twenty-five-dose packages, the number of doses being indicated on the wrapper.

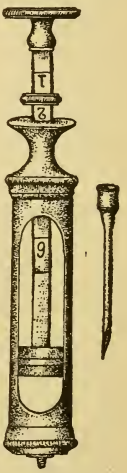

Fig. 55. Hypodermic syringe for vaccinating.

In preparing the vaccine and using it, care must be taken that the instruments and the other accessories are absolutely clean and sterilized. In using the double vaccine, the powder is first placed in a little porcelain mortar and some clean boiled water measured out, a few drops of which are added to the vaccine, which is thoroughly ground into a very fine paste in the mortar. After this is done, the remainder of the boiled and cooled water is added, one cubic centimeter for each dose of vaccine. The mixture is then filtered through filter-paper or cotton placed in a sterile glass funnel, and is then ready for use. The syringe is filled with the vaccine, and one cubic centimeter is injected beneath the skin of each animal over eight months old; under eight months, the dose should be graduated according to the size of the animal.

The safest place to inject the vaccine is on the under side of the tail about four inches from the tip, although some vaccines may be injected beneath the skin of the

neck or shoulder. In case the latter place is chosen, care should be taken not to push the needle into the muscles, but simply into the loose tissue beneath the skin. The single vaccines should be used in the tail, to insure safety. Vaccine should not be kept more than an hour or two after mixing, and then only in a clean, well-stoppered bottle. Vaccinating instruments, with the necessary accessories, can be purchased at from $3.50 to $5.00. Before using, the instruments should be thoroughly cleaned with boiling water, and this precaution should be repeated just after using. Any cotton or filter paper which contains sediment should be burned. In using the double method, the second vaccine should be prepared as already described, and injected about ten days after the first vaccination.

Vaccination will ordinarily protect cattle for one year, although calves under eight months old should be re-vaccinated, if possible, when they are yearlings. The best time to vaccinate cattle is before they are turned on grass in the spring, or just before they are placed on dry feed in the fall. Avoid extremes of weather when vaccinating, as well as in branding or other surgical operations that are likely to lessen the vitality of the animal. If the cattle can be confined in a narrow stall, or, better, in a narrow chute, with a little practice a hundred head an hour can be vaccinated. There are no visible effects from vaccination, if the operation is carefully performed. Full directions for use accompany all the vaccines that are on the market.

A medicine that is used as a preventive of blackleg in some parts of the West is as follows:

Sulfur	10 pounds
Saltpeter	3 pounds
Sulfate of iron	6 pounds
Air-slaked lime	3 pounds

Pulverize the ingredients, mix thoroughly, and use one pound of this mixture in one gallon of common salt. This is to be given to animals in the place of common salt.

RABIES, HYDROPHOBIA

Rabies is an infectious disease, originating in dogs, possibly also in wolves, cats and skunks, and by them transmitted to other animals by direct inoculation, usually by biting. Animals suffering from rabies are said to be "mad." Hydrophobia, the common name, means "fear of water," and the inference is that animals suffering from this disease are afraid of water; but this is not true. "Mad" animals usually crave water, but the excitement and effort of drinking are likely to cause convulsions, which have been mistaken for fear.

Although rabies has been studied extensively, and an attenuated virus for preventing the disease has been discovered and introduced by Louis Pasteur, the germ that causes the disease, if germ it is, has not yet been isolated. The virus exists in the saliva, as well as in some other parts of the body, and when injected into a wound is likely to cause the disease. There is less danger from being bitten when the teeth of the rabid animal are cleaned by biting through cloth or leather.

There is a popular idea that rabies is most prevalent

during the hot months, but statistics show that a slightly greater number of cases occur during the winter months. In the dog, rabies occurs in two forms, the dumb and the furious, the latter being the most frequently observed. The period of incubation,—that is the time that elapses after the animal or person is bitten and the appearing of first symptoms of the disease,—varies from a few days to many months, the average being from three to six weeks.

The first symptom usually seen in dogs is a dull, depressed condition. The dog crawls into obscure places and dislikes to be disturbed. He licks the original wound and the genital organs. The appetite is abnormal, the dog eating grass, sticks, dung, and the like. As the disease progresses, the dog becomes cross, snapping at space or at inanimate objects, at other animals, and at persons.

A rabid dog shows a tendency to wander, often going long distances and attacking persons and animals. If confined, he will bite sticks or other objects, and sometimes will tear his own flesh. In the later stages of the disease, the dog becomes exhausted, the eyes sunken and the body emaciated. Associated with this is paralysis, particularly of the hind parts and the lower jaw, the latter condition being accompanied with a discharge of saliva. The bark of a rabid dog is peculiar,—a short bark prolonged into a whine. Death occurs from exhaustion soon after paralysis sets in.

Post-mortem examination of dogs that have died from rabies does not give definite information. There is slight irritation of the stomach and bowels, the

stomach often containing sticks and other foreign bodies swallowed by the dog during the progress of the disease. In order to diagnose suspected cases of rabies, inoculations of the cranial cavities of rabbits can be made with some of the spinal marrow from the suspected case. If the rabbit contracts rabies, the diagnosis is positive.

The symptoms of rabies in cattle are delirium, in which the diseased animal attacks other, and particularly smaller animals and persons; trembling of the muscles, and difficulty in walking, due to a knuckling of the fetlocks. In most cases the animal keeps up a hoarse bellowing, and there is violent straining as if to pass excrement.

Horses, when attacked by rabies, become excited and furious, attacking other animals or inanimate objects, sometimes breaking their teeth in their fury.

After an animal has contracted the disease it should be put out of its misery, as there is no hope of recovery from rabies. When a person or animal is bitten by an animal supposed to be rabid, the wound should be cauterized with nitrate of silver or other strong caustic, and antiseptics freely used. Dogs are to be securely confined, to prevent the possibility of their injuring any one. They are likely to disappear should the disease develop. Persons bitten by rabid animals should have the Pasteur treatment.

When an outbreak of rabies occurs among cattle, the drinking place should be disinfected, and the healthy animals kept from the rabid to prevent the possibility of infection.

TEXAS, OR SOUTHERN CATTLE FEVER

This disease is also called Spanish, splenic, acclimation, and (in Australia) "tick" fever. In some regions, owing to the color of the urine, the disease is called "redwater." It is caused by a microscopic animal germ (*Pyrosoma bigeminum*), and is transmitted from southern to susceptible northern cattle by means of the southern cattle-tick (*Boophilus annulatus*). Fig. 52. Southern cattle coming from the region south of central Virginia and Tennessee, and east of central Indian Territory and Texas, and from Lower California, come from a permanently infected territory, and have the germs of Texas fever in their blood; but they do not suffer from Texas fever, as they possess immunity. The region described is south and east of the quarantine line established by the United States Department of Agriculture, and marks the northern and western limits of the region permanently infested by the southern cattle-tick.

When southern cattle are brought north during the warm season of the year, the mature female ticks drop from their bodies and lay a great number of eggs that hatch in from two to six weeks. The young ticks are quite active and show a tendency to crawl up on grass rather than sidewise. When susceptible northern cattle pass over the tick-infested ground, these young ticks get on their legs, crawl up to their bodies and soon bury their mouth-parts in the thin skin on the belly or the inside of the thighs. In this manner they transmit the germs of the disease. About ten

days after the young ticks are established on the susceptible cattle, the animals begin to show symptoms of Texas fever. Ordinarily from thirty to forty days elapse after southern cattle pass over and infest the ground, before northern cattle come down with the fever; but this time may be extended several weeks, depending on the temperature. When susceptible northern cattle are taken into southern territory that is infested by the cattle-tick, the symptoms of the fever usually appear in about ten days. The mortality from Texas fever is high, varying from twenty-five to ninety per cent, depending on the weather and the amount of infection.

In some regions in the South close to the quarantine line, Texas fever is quite common among cows that run at large, or on the commons. In localities farther north, cattle that run at large get the ticks from the litter cleaned from cars in which southern cattle have been shipped; the disease is then commonly known as the "town-cow disease," but it is Texas fever.

There is loss of appetite and suspended rumination, although these symptoms are preceded by a high fever, the temperature going as high as 105° to 108° F. There is great weakness and prostration as the disease progresses, with trembling of the voluntary muscles and difficulty in getting up. The head droops, the ears lop, the flanks are "tucked up." There is usually constipation, though in some cases there is diarrhea instead. Diarrhea is considered a good symptom, as more of such cases recover. In milch cows, the secretion of milk is stopped. The urine is a dark cherry-red in

almost all cases ; this may be considered as a marked symptom of this disease. Young cattle-ticks will be found on the belly, inside of the thighs, on the fore-legs or brisket. They are very small, and a close examination is often necessary to reveal them.

Post-mortem examination reveals the following changes : The gall-bladder is distended with a dark tarry, or thick granular bile. The spleen is greatly enlarged and of a tarry consistency, hence the name, "splenic fever." The bladder contains a quantity of dark red urine.

There is no known satisfactory medicinal treatment. As soon as the disease occurs, all well cattle should be removed from tick-infested ground and away from tick-infested cattle. The ticks can be scraped off by using a dull knife, provided there are but a few cattle and they can be handled. The ticks so removed should be destroyed. Sick cattle should be made as comfortable as possible, watered frequently, and kept out of the hot sun. If they will eat, laxative green food may be given, such as green corn-fodder. Drenching sick cattle with sweet milk is also to be recommended.

Texas fever can be prevented by a strict quarantine against tick-infested cattle, as the cattle-tick is the only way, so far as known, by which the disease is transmitted. Southern cattle do not spread the disease during cold weather. The ticks are destroyed by the cold as soon as they drop from the bodies of cattle, or the eggs are destroyed, so that no young ticks hatch. If the ticks are all removed from southern cattle, the latter do not communicate the disease. Dipping south-

ern cattle in solutions, and various other means, have been tried for destroying the cattle-ticks, without success. Recent experiments, however, give promise that a dip will soon be perfected that will destroy the ticks. One attack of Texas fever gives immunity, and young calves are not so susceptible to the disease as are older animals. It is probable that the reason that southern cattle do not have Texas fever is because their immunity was acquired as very young calves at an age when they do not seem to be seriously affected by the disease.

The Missouri and Texas Experiment Stations have devised a method of conferring immunity on susceptible cattle intended for shipment into permanently infected territory. It is by injecting serum obtained from the blood of immune cattle, and is very successful. Cattle intended for such shipments should be young, and should be taken in the fall, when the ticks are not so numerous and the weather is cool.

When an outbreak of Texas fever occurs, there is no danger to cattle in the surrounding territory, provided they are kept off infested ground. It is commonly said by stockmen that "a wire fence will stop the spread of Texas fever," but it is safer to put a greater barrier, in the way of distance, as the young ticks may be washed short distances, or cattle may break through a fence and carry the ticks. After an outbreak of Texas fever, no susceptible cattle should be allowed on the infested pasture or quarters until the ticks have been destroyed by the cold of winter.

CONTAGIOUS ABORTION

Contagious abortion is most common in cows, although it sometimes occurs among mares, when large numbers are kept together, as on some of the ranges of the West. In some dairy regions, contagious abortion is one of the most serious diseases that dairymen have to contend with. After the disease is once established in a locality, it is difficult to eradicate it entirely.

The cause of contagious abortion is believed to be a germ, or perhaps several kinds of germs. The disease is transmitted from an animal that has aborted to a pregnant animal, by means of discharges from the vagina or by the fœtal calf or the membranes. It seems probable that the disease can be communicated by a bull that has served a cow that has aborted.

Cows may abort at any stage of pregnancy, but the disease occurs most frequently after the fourth month; earlier than this there are few symptoms. Sometimes there is discharge of mucus from the vagina, and the vulva may be slightly swollen. There may be small yellow ulcers on the mucous membrane lining the vagina, which can be seen by opening the vulva. As the cow is farther along in pregnancy, the signs of abortion are those of approaching parturition; there may be a rope of mucus hanging from the vulva, the milk secretion may start, and the cow be "down in her hips."

When a cow shows signs of aborting, or has aborted, she should be isolated from other cows, and the place where she has stood should be thoroughly disinfected

by using a 5 per cent solution of carbolic acid or a 1 to 1,000 solution of corrosive sublimate, after the stall has been scraped and all loose litter burned. After using the antiseptic, the stall should be treated to a good coat of whitewash. The aborted calf and the membranes are to be destroyed by burying deeply or burning, and the vagina and uterus washed out every day with a solution of corrosive sublimate (1 part to 1,000 parts of water). The tail and adjacent parts are also to be washed with this solution. Tablets of corrosive sublimate can be procured from druggists, with directions for use. This treatment of the vagina should be continued as long as the discharge is observed, and the adjoining parts should be washed daily for ten days afterward.

No cow that has aborted should be bred until some time after all discharge has ceased. For two days before breeding, the vagina should be washed out with the 1 to 1,000 solution of corrosive sublimate; the day she is bred, warm water should be used in its place, as the corrosive sublimate will destroy the semen. In some cases, cows become barren after abortion. Cleanliness, the free use of antiseptics, isolation of infected cows, and precautions against breeding to infected bulls are the best methods of combating this disease. The disease seems to "wear itself out" and disappear from a herd after a time.

As preventive remedies, sulfite or hyposulfite of soda, in ounce doses two to three times a week, may be of value. A mixture of one pound of pulverized hyposulfite of soda, one pound of sulfur and ten pounds of

common salt, seems to give good results. A small handful is given to each pregnant cow two or three times a week. Cows should be kept in fair flesh and in a good, vigorous condition.

FOOT-AND-MOUTH DISEASE

Foot-and-mouth disease is a highly infectious disorder, attacking cattle principally, but easily transmitted to sheep, goats, pigs, and other domestic animals. Man frequently contracts the disease from infected animals. It is generally considered to be a germ disdisease, although the specific organism has not been discovered. This disease has been known for many years in Europe, and immense losses have followed its ravages, some parts of Europe rarely being free from it, and in other parts outbreaks occurring at irregular intervals. One attack of the disease does not confer immunity, as an animal may have it several times.

Foot-and-mouth disease varies in virulence. In some outbreaks many animals die, but in most cases the mortality is not high, the greatest loss resulting from a falling off in flesh and general deterioration resulting from the disease, and the necessary restriction of the live-stock trade which follows. The disease is transmitted by direct contact, and through the medium of infected food, litter, watering places, stables, cars and attendants. It is possible that the contagion may be carried short distances in the air. The milk of an affected animal is highly dangerous. The period of incubation, or the time that elapses between exposure

and signs of the development of the disease, usually is short, but may vary from twenty-four hours to twenty days. Most cases develop within two or three days after exposure.

Foot-and-mouth disease usually starts with a chill. The animal remains by itself, the back is arched, hair erect, flanks tucked up, and there is shivering or twitching of the muscles. A sick animal moves with reluctance, and there is stiffness or marked lameness in the gait. A thick, yellowish secretion collects at the inner corners of the eyes and about the edges of the nostril. The temperature of the animal rises from two to five degrees Fahr. Blisters form in the mouth, about the feet and on the udder. The blisters vary in size from that of a pea to a quarter of a dollar, and are filled with a watery fluid. They soon burst, leaving raw sores with shreds of tissue hanging about the edges. In the mouth the blisters usually form on the lips, tongue, cheeks and pad of upper jaw. The animal champs the jaws with a smacking noise. There is profuse slavering from the mouth. The saliva at first is normal, but later becomes thick and ropy. The mouth is often so sore that the animal is unable to partake of solid food. The blisters about the feet usually occur between the toes of cattle, or about the coronet, and often cause severe lameness. One or all of the feet may be affected. After the blisters burst, raw, angry sores result. In some cases, the hoof may be shed, or the ulceration may involve the greater part of the soft structures of the foot.

So far as known, foot-and-mouth disease was first introduced into America in the summer, or early fall, of

1902, being first discovered in the New England states, where it has been confined by rigid quarantine restrictions, prescribed by the general government and the various states. A vigorous and apparently successful effort is being made to stamp out the disease by quarantine. Destruction of affected animals and thorough disinfection,—these are the only methods that have ever been effective in dealing with this disease. Diseased carcasses should be buried deep or burned. Hides or wool should not be saved, nor should diseased carcasses or milk from a diseased animal be fed to other animals. Suspected cases should be at once reported.

TUBERCULOSIS

Tuberculosis is a communicable disease that may attack any of the domestic animals, though it is found mostly among cattle. In man, tuberculosis is commonly known as consumption, and is one of the most serious diseases that threaten the human race.

The cause of tuberculosis is a germ or bacterium known as *Bacillus tuberculosis*. The germs are always present in the system of the animal having the disease. Any condition which weakens the animal's system lessens its power of resistance to this disease. As a result of the drain upon the system due to the production of large quantities of milk, tuberculosis is especially prevalent among dairy cows, and is one of the most serious diseases that dairymen have to contend with. It is rare among cattle native to the ranges of the West.

Tuberculosis is important not only on account of the losses among cattle, but because of its relation to the public health. Milk from cows that are badly affected with tuberculosis, and especially when the udder is affected, is considered to be dangerous as food for man, unless it is pasteurized by heating it to a temperature of 185° Fahr.

Tuberculosis is one of the most insidious diseases of animals, as it attacks almost any part of the body, and a great variety of symptoms follow as soon as it is well established. Symptoms vary according to the severity of the disease and the part or organ of the body affected. Tuberculosis attacks the lungs most frequently; the liver, diaphragm, or "midriff," lymphatic glands, bones or joints may also be the seat of the disease. When the lungs are attacked and become badly diseased, the animal is out of condition and falls away in flesh; the appetite is capricious; the coat is rough and staring; the eyes are sunken and dull. There is usually a cough, that is especially noticeable when the animal is first disturbed in the morning, or when it is turned out to exercise in cold air. There is often a discharge from the nose and eyes, this drying at the inner corner of the eye. When the udder is affected, there is slight inflammation of that part of the gland, followed by the formation of hard lumps within the gland; in some cases, these lumps gather and break, discharging a yellowish pus.

The germs of the disease, when scattered about stables or yards, may enter the system of a healthy animal through wounds (which is probably a rare

method of infection), or by being taken in with the food or by being inhaled and taken into the lungs. In the transmission of the disease from one animal to another, the germs are probably conveyed by one of the last two methods. Suckling calves may get the germs in the milk from a tuberculous cow, or they may take them upon dry food or in drinking water, where they

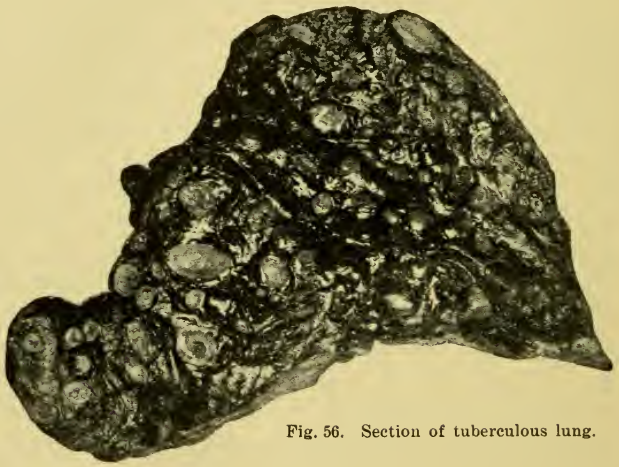

Fig. 56. Section of tuberculous lung.

were scattered by diseased animals. It is probable that the discharge from the nose, which contains the germs, being dried, is stirred up in the form of dust, and when inhaled by healthy animals produces the disease. In a few cases it is possible that the disease may be congenital. Such cases are rare, and occur only when the cow's generative organs or her whole system are diseased.

When an animal that has had tuberculosis is examined after death, the diseased tissue appears as lumps or nodules either in or on the organ attacked. If these rather hard lumps are cut open they will be found to contain a yellow, cheesy substance, which in many cases has turned to pus or matter, usually thick and yellow, with lumps of cheesy material in it. Sometimes the disease appears as a fibrous growth in reddish bunches on the outside of the organ, or part, such as the lungs, heart, liver, diaphragm, or "midriff," or on the lining membrane of the chest or abdominal cavities. These lumps or tubercules vary in size from that of a pinhead to that of a marble, and may be so thick as completely to cover the surface. Fig. 56.

There is no treatment known that cures tuberculosis in cattle. However, there are preventive precautions. The best method of preventing the disease is to prevent healthy cattle from coming in contact with infected ones, or with infected stalls, food, feed-boxes, and drinking-places. If an animal has the disease, or is suspected, it should be isolated from others and the quarters thoroughly cleaned and disinfected by a 5 per cent solution of carbolic acid in water. Aside from protecting cattle from the germs of the disease, the best method of preventing it is to keep the animals healthy and vigorous. Dark, damp, filthy and badly ventilated stables are hotbeds for the propagation of the disease, once it is introduced. Sunlight is a great disinfectant. In fact, the germs are killed when exposed to direct sunlight for a few hours. Plenty of fresh air is also very important, preserving the animals' health by

bringing oxygen, carrying away the waste, and keeping the quarters dry. Sunlight, fresh air, dryness and cleanliness, with good food, are essentials in preserving a healthy herd.

The Tuberculin Test

The most accurate means of detecting tuberculosis in cattle is by injecting a small amount of "tuberculin" beneath the skin. If the animal has the disease, there follows, in about twelve hours, a rise of temperature or fever, which lasts for a few hours and then subsides. Tuberculin is a toxin excreted by the tubercle bacillus during the process of its growth. When prepared for use, tuberculin contains no germs of tuberculosis, and is incapable of producing the disease.

In testing animals with tuberculin the temperature of the tested subject is taken with a clinical (fever) thermometer every two hours, beginning at 6 A. M. and continuing until 12 P. M., when a small quantity of tuberculin is injected under the skin and the temperature again taken as on the preceding day. If the animal has tuberculosis there is a rise of temperature of two to six degrees Fahr. If the animal is free from the disease the temperature does not rise or vary more than the normal daily variation. Careful attention should be given to the manner in which the temperature rises. A sudden and rapid rise of temperature is to be regarded with suspicion. In a typical reaction to the tuberculin test, the temperature rises gradually for two hours or more until it attains its maximum; then

it gradually subsides. While the testing by tuberculin is not a difficult task, it is usually economy to employ some one who has had some experience, and who can give due consideration to the various influences that modify the reaction. Cattle should not be tested too frequently with tuberculin, as the system acquires a tolerance and does not respond accurately. One test yearly, or not oftener than once in six months, is usually efficient.

In testing cattle, the animals should be disturbed as little as possible. They should be given small quantities of water frequently, but not turned out and allowed to drink large quantities, as this is liable to cause a sudden fall of temperature.

Tuberculin is not infallible. In some cases, especially when the animal is badly diseased, it fails to cause a rise of temperature, and in a few cases it causes a rise of temperature in healthy animals; but the percentage of the errors is but a fraction of one per cent; and at the present time tuberculin is the most effective means known for detecting tuberculosis in animals.

After a herd has been tested and all tuberculous animals have been removed, the barns and stables should be thoroughly cleaned and disinfected before other cattle are put in. No animals should be admitted to a healthy herd until they have been tested and found to be free from this disease.

In Denmark, the following plan for eradication of tuberculosis, called the Bang method, has been tried with success. All cattle are tested with tuberculin, and those

that are free from the disease are placed in uninfected quarters, where they cannot contract the disorder. It has been demonstrated that nearly all calves born of tuberculous mothers are free from the disease at birth. As soon as the calves are dropped, they are taken from the cows and placed in uninfected quarters, where they are fed on sterilized milk. The calves are tested in a short time, and should any respond they are removed. In most cases the calves are tested several times before reaching maturity. In this manner only healthy animals are raised for breeding and dairy purposes, and tuberculosis is being eradicated from the Danish dairies without the serious loss that would result from the immediate destruction of all tuberculous animals.

Professor Koch, the eminent German scientist who discovered the germ of tuberculosis, thinks that tuberculosis of cattle is not communicated to man by any ordinary methods, and that there is no danger of persons contracting the disease from using the milk of tuberculous cows. Nor does he think that tuberculosis or consumption of man can be transmitted to cattle by ordinary methods. If this view is correct, the importance of tuberculosis resolves itself into the financial question of preventing the losses among cattle that result from this disease, which in itself is an important one. Whether there is danger to man or not, there is a strong prejudice against using the milk from cows that are known to be tuberculous, especially for children and invalids; and it is unwise to run any risks with this serious disease, considering the incompleteness of our present knowledge of it.

COWPOX

The horse, sheep and cow each has a variety of pox, but cowpox is the form that is commonly seen in this country. Cowpox is a germ disease that attacks cows particularly, in the skin in the region of the udder or teats, and is characterized by sores in this region. The disease is usually transmitted from one animal to another by the hands of the milker, by calves, or by direct contact.

About a week after the infection is transferred, small pimples appear on the skin. At first these contain a watery fluid, which later turns to pus. The base of the sore is hard and red. After the pustule is broken, a thick, dark scab forms that has a depressed center. Later, this comes off, leaving a small pit or pock mark. Cowpox can be transmitted to man by direct inoculation, as by sores on the hands. The fluid from the pimples or pustules of cowpox is the material used to vaccinate persons against smallpox.

Little can be done after an animal has contracted the disease, except to keep the parts soft by applying some healing ointment. Oxide of zinc ointment is excellent. After milking, a little white lotion may be applied, followed by the zinc ointment. When the udder is greatly inflamed, bathing with hot water twice daily is excellent. In milking, animals affected with cowpox should always be milked last, so that the milker will not carry the disease to healthy cattle. After milking, the hands should be carefully washed and disinfected. The milk should not be used for food.

DOG DISTEMPER

Distemper is a contagious catarrhal fever that is a common and serious disease among dogs.

The disease is caused by a germ, and animals contract it from coming in contact with or proximity to another animal suffering from the disorder. It is thought that the germs float through the air and are inhaled by the dog. Among the conditions that favor the disease are those that tend to weaken the system. Pure-bred puppies appear to suffer greatly from it. The time that elapses between exposure and the first symptoms is seldom more than three days. When dogs are gathered at shows the disease is likely to occur, owing to exposure to infection and the unusual nervous strain. One attack of the disease usually gives immunity to future attacks.

The disease is brought in with a chill, that may last an hour or more. It is followed by a high fever, the dog's temperature going to 107° Fahr. There is a slight discharge of watery mucus from the nose and eyes, that soon becomes profuse and purulent, sticking the lids together. Usually a rash breaks out on the inside of the thighs. In some cases there are nervous symptoms, shown by the jerking of the head and twitching of the muscles; or the dog may become delirious. Often there is difficult breathing, with a painful cough or moan. The bowels may be constipated, or there may be a severe diarrhea, with a fetid odor. The dog suffers greatly from prostration, and dislikes to be disturbed. The disease runs its course in ten to thirty

days. Distemper in dogs in some respects resembles scarlet fever in the human family.

There is no medicine that will interfere with its course. All the treatment should be directed toward making the animal comfortable and keeping up its strength so that it may resist the disease. Vigorous dogs of good constitution will usually recover; weak, debilitated animals are likely to be overcome by the disease or by various complications.

In the early stages, castor oil in doses of half an ounce, with two or three grains of boric acid added, should be given every six hours until the bowels move thoroughly. This may be followed by two-grain doses of quinine, twice daily. The nose, mouth and eyes are to be well washed out with warm water three times daily, and the nose and eyes greased with vaseline. The animal is to be given minced fresh beef, beef tea, sweet milk, raw eggs and gruels, and allowed what cold water he wants to drink. Dried blood in doses of one-half to one teaspoonful three times daily is excellent all through the disease.

There are many complications that occur with this disease: pneumonia, bronchitis, inflammation of the brain or spinal cord, and paralysis, usually of the hind quarters. When the dog recovers, abscesses are likely to form in some part of the body. If these occur in the internal organs they are often fatal. Another common sequel is chorea, or St. Vitus' dance, as shown by a jerking of some parts of the body.

All infected quarters should be thoroughly disinfected and exposed to the sun and air for several

weeks before allowing other susceptible dogs to occupy them.

HOG CHOLERA AND SWINE PLAGUE

Hog cholera and swine plague are different diseases, and yet they are so closely associated that one disease rarely appears without the other. Swine plague is an infectious pneumonia, that attacks swine when in poor, unthrifty condition, or when run down from an attack of hog cholera. It is probable that germs of swine plague are widely distributed wherever hogs are kept in large numbers, but the natural power of resistance of the animal's system is sufficient to prevent them from developing after entering the system. When, however, the system becomes weakened from disease or other injurious influences, the germs obtain a foothold and often cause serious damage, not only from the deaths that directly result from the pneumonia but from the hog cholera, with which the swine plague is usually associated.

Hog cholera is an infectious disease of the intestinal tract, closely allied to typhoid fever in man. The hog cholera is aggravated by the pneumonia, and between the two diseases the vital powers of the animal are greatly lessened. In man, typhoid fever and pneumonia are often associated. The losses from hog cholera and swine plague are difficult to estimate accurately. Persons familiar with the subject estimate that the losses caused by these diseases are greater than those caused by any other disease of domestic animals. Others go further, and

estimate the loss to be greater than that resulting from all other diseases of animals combined. Hog cholera and swine plague are the greatest drawbacks to the swine-raising industry in the central and western states. These diseases are usually found in regions where hogs are raised in large numbers, where there is a large amount of traffic in swine, where they are fed largely on one kind of food, and where the sanitary and hygienic conditions are bad. It must not be inferred that hygiene and sanitation will prevent these diseases entirely. When the germs of hog cholera are introduced among healthy swine with the most hygienic surroundings, heavy losses are very likely to follow. And yet it is probable that if careful attention were paid to feeding, care and sanitation, together with reasonable precautions to prevent the introduction of the germs of hog cholera, the losses could be reduced one-half.

In the care of hogs, the essentials are clean quarters and pure water. When hog cholera is in the vicinity, care must be exercised not to allow swine access to streams where disease prevails above them, as cholera frequently follows brooks and rivers. A variety of food is also essential to the maintenance of good health. Swine are omnivorous animals, living upon both animal and vegetable materials. When fed largely on one kind of food, such as corn, they get fat and appear healthy, but such animals are susceptible to hog cholera, and among such the disease is likely to assume a virulent type.

In addition to variety in food, swine should have

access to mineral substances, such as wood ashes, slack coal, salt and sulfur. These ingredients can be mixed and placed where the hogs can get at them. Stock hogs need exercise and a run on pasture, where they can get green food and come in contact with fresh earth. Dish-water and swill from the farmhouse are excellent, but garbage and city slops should be used with caution, as they often contain large quantities of soap powders and other materials that are injurious when fed freely.

Hog cholera occurs sometimes in a mild form, but often in a virulent and fatal type. In the latter type, the first indication of the disease is finding a dead animal; or an animal noticed to be ailing in the evening will be found dead the next morning. If the disease is of a milder type, or if the conditions are favorable to watching its progress, the following symptoms will be noticed: The animal first appears dull and quivering, showing a tendency to hide away in the bed, and to shiver as it lies there. It evinces a dislike to be disturbed, and when driven from its bed moves stiffly, and is likely to cough and sneeze. Sick pigs show a tendency to wander away, often long distances. There is a rise of temperature in the early stages of the disease, before the physical symptoms appear, the temperature rising from 103° F., or thereabouts, to 107°. There seems, to the writer, to be a characteristic odor to the disease that is quite pronounced, but difficult to describe.

The following description of the symptoms, by the Iowa State Board of Health, is excellent: "The pres-

ence of the disease is indicated by cold shivering, lasting several hours; frequent sneezing, followed by loss of appetite; rough appearance of the hair; drooping of the ears; stupidness; attempts to vomit; tendency to root the bedding and to lie down in dark and quiet places; dullness of the eyes, often dim; sometimes swelling of the head; eruptions on the ears and other parts of the body; dizziness; laborious breathing; vitiated appetite for dung and for dirty and salty substances; accumulation of mucus in the inner corner of the eye and a discharge from the nose; fetid, offensive discharge from the bowels, offensive exhalations; semi-fluid diarrheal discharges of grayish green color, often mixed with blood. In many cases, the skin on the belly between the hind legs, behind the ears, and even on the nose, has numerous red spots, which toward the fatal termination of the disease turn purple. As the disease progresses, the animal becomes sluggish, the head droops, with the nose hidden in the bedding. If there has been costiveness, about two days before death there will be offensive, fetid discharges from the bowels; the voice becomes hoarse; the animal is stupid; emaciation increases rapidly; the skin becomes hard, dry and unclean; there is a cold, clammy sweat, and death soon follows, attended by convulsions, or comes on gradually from exhaustion without a struggle. In chronic cases or those of long duration, the animal becomes weak, lies down most of the time, eats but little and has diarrhea. These cases may linger for weeks, scattering the poison of the disease wherever they go."

In addition to the above symptoms, in chronic cases there is often swelling of the joints, with lameness. The skin also cracks and large sores often result. In those cases when there is diarrhea in the early stages, there is usually a better chance of recovery. Many swine-raisers who have had experience with cholera think it is economy to kill an animal as soon as it shows signs of the disease, as few ever recover, and those that do, recuperate slowly and require a long period of care. Animals that recover are immune to future attacks. When swine plague is prominently associated with the cholera, there is coughing, panting and short, labored breathing, especially when the animal is quickly exercised.

Post-mortem examination reveals inflammation of the lungs, due to swine plague, some inflammation of the heart and its coverings, irritation of the small intestines, with ulcers on the mucous membrane lining the large intestine. Intestinal worms are frequently found in considerable numbers.

Medicinal treatment of hog cholera is very unsatisfactory. Scores of remedies, regarding which wonderful assertions were made, have been exploited, with little or no benefit, except to the person who sells them at a large profit. Some remedies benefit the sick animal by toning up the system, or by supplying needed mineral elements. The following remedy suggested by the Bureau of Animal Industry of the Department of Agriculture, and commonly known as the "government remedy," is as good as any, and much cheaper than most of them:

Wood charcoal	1 pound
Sulfur	1 pound
Sodium chloride	2 pounds
Sodium bicarbonate	2 pounds
Sodium hyposulfite	2 pounds
Sodium sulfate	1 pound
Antimony sulfide	1 pound

"These ingredients should be thoroughly pulverized and mixed. The dose of this mixture is a large tablespoonful for each two hundred pounds weight of hogs to be treated. Give only once daily." It is better to give this remedy mixed with sweet milk, or in gruel, or mixed with raw eggs well beaten.

At the present time, no satisfactory protective treatment in the way of vaccination or inoculation has been devised, although the ablest investigators in this and other countries have been searching for some method of this kind. Some swine-raisers think that a measure of protection is given by allowing the well hogs to eat the thoroughly cooked flesh of an animal that has died from the cholera. In trying this, be sure that the meat is thoroughly cooked, as allowing them to eat the uncooked meat would inoculate them with the living germs.

Many farmers who have had experience do not wait for the disease to make its appearance, but, as soon as it reaches a dangerous proximity, dispose of their hogs, and thus avoid infecting their farms and evade the possibility of selling animals that may be coming down with the disease. Diseased swine must not be sold.

In dealing with hog cholera, it must be remembered

that the disease is caused by a microscopic germ, and that the opportunities for its distribution are many. The germ of hog cholera is active and free-swimming, and so small that hundreds of them can live in a single drop of water. The swine plague germ is not free-swimming.

The germs of hog cholera are scattered about by the discharges from sick animals as they are moved over the country. When hogs are shipped in cars, the latter become infested; hence, the necessity of thoroughly disinfecting cars before shipping healthy hogs in them. Streams are frequent sources of infection; it is common to find the disease occurring at farm after farm in succession along a watercourse. The writer has seen the bodies of hogs floating down streams during outbreaks of cholera. Sick hogs are likely to wander away to adjoining farms, thus scattering the infection. Dogs, wolves, foxes, crows and other animals that feed upon flesh may carry the germs, often long distances.

The bodies of hogs that have died from the disease should be burned or buried deep. When the outbreak is severe and many animals die, the carcasses are often disposed of in a careless manner, that is a menace to the health of other hogs in the neighborhood. Germs of hog cholera may also be carried on the shoes of persons visiting infected localities. Whenever hog cholera occurs in a herd of swine and an attempt is to be made to stop its progress, the healthy animals should be removed from the sick and placed upon uninfected ground some distance away. When swine plague occurs without hog cholera, it can often be

stopped by these measures, in connection with the cholera remedy of the Bureau of Animal Industry (page 393).

FOWL CHOLERA

The term fowl cholera is applied to most of the diseases of fowls that are associated with a diarrhea, especially if a number of fowls are attacked, or if the disease seems to be contagious. Some of these diseases may be induced by improper food or surroundings; and whenever an outbreak occurs these conditions should be carefully investigated.

True fowl cholera is a contagious disease, attacking fowls of all kinds, though it is most common among chickens. It is caused by a well-known germ, that is probably taken into the system with the food or drink, and possibly with dust or dirt that is inhaled or eaten accidentally.

The first symptom of the disease is a yellow color of the usually white part of the droppings. This is soon followed by severe diarrhea, the discharges being thin and watery, sometimes frothy, and of a yellowish green color. The sick chicken often craves green material, and shows a depraved appetite, eating various substances that are unusual. Later, the appetite fails, the chicken becomes dull and stands with the head close to the body, the eyes closed, and exhibits signs of great weakness and prostration. In some cases, fowls die very soon, often within three or four days after infection; in other cases, they linger for weeks with a

chronic form of the disease. Toward the termination of the disease, the diarrhea becomes less severe, and the process of digestion seems to be stopped, as the crops of dead chickens remain filled with undigested food. All dead fowls should be burned.

All fowls that do not show signs of the disease are to be removed to uninfected grounds, and given a variety of nourishing food, with pure water, both of which should be free from contamination by the germs of the disease. No dishes used for sick fowls are to be used for the well ones. Attendants should not go from infected ground to localities where healthy fowls are kept.

Medicinal treatment is not always satisfactory. One of the best remedies is the following:

Sulfate of iron	1 dram
Dried blood	½ ounce
Tincture of opium	½ ounce

These should be dissolved and mixed with a pint of water, or with thin, easily digested food, and from one to two teaspoonfuls given to each fowl three or four times daily.

After the disease has disappeared, no healthy fowls should be brought into the infected quarters until they have been thoroughly disinfected. It is best to disinfect, whitewash, admit sunshine and fresh air to the quarters for six months to one year after the disease has disappeared. It is the best plan, where a considerable number of fowls are kept, to divide them into small separate flocks, as they do better, and contagious diseases are more easily checked.

BLACK HEAD

This is a disease of turkeys and chickens, due to the presence in the intestines of an animal germ. It is frequently seen in the eastern states.

There is diarrhea, resembling that of fowl cholera, except that it is not so severe and is not attended with great weakness and prostration. There is dullness or partial stupor. As the disorder progresses, the comb, and later the wattles, become dark purple, a symptom from which the disease takes its name.

At present there seems to be no satisfactory medicinal treatment. The best plan is to kill the bird as soon as the first symptoms appear and burn the body. The quarters should be disinfected and kept clean. The food and water supply must be wholesome. If these things are carefully looked after, and no diseased birds are allowed to remain with the healthy ones, there is little trouble in checking the difficulty.

ROUP

Roup is a contagious inflammation of the mucous membranes of the head of fowls, associated with a catarrhal discharge from the nostrils and eyes. It is a common disease, especially when poultry is kept in damp and unsanitary quarters. It is due to a germ which may be introduced by means of diseased fowls, or by infected coops or pens. Good care and food enable birds to resist invasion by the germs. Any conditions that tend to lessen the vitality of the bird favor the development of the disease.

At first, the discharge is thin and watery; but later it becomes thick and yellow, collecting about the nostrils and in the eyes and throat. The fowl is often unable to see, owing to the inflammation, swelling and collecting of matter about the eyes. As the disease progresses, the comb and wattles become abnormally red, and the clogging of the nostrils and throat makes breathing difficult. Throughout its sickness, the bird is dull and weak, with plumage rough and erect. Finally, the fowl becomes unconscious and then soon dies.

In most cases, the best treatment is to kill and burn the bird as soon as the disease appears. Antiseptics used about the head will usually overcome the disease. Creolin, one part to one hundred parts of water, is excellent; also, boric acid, twenty grains to one ounce of water; also, kerosene oil. In all cases, the mucus should be washed away, the parts well cleaned, and the remedy thoroughly applied.

In the spring or fall it frequently happens that a number of birds are noticed sneezing and snuffing from colds, with a slight discharge of mucus from the nostrils. For these "colds," and as a preventive of roup, one teaspoonful of pure carbolic acid to one gallon of drinking water, is excellent.

CHAPTER XVII

MISCELLANEOUS DISEASES

THERE is no single satisfactory method of classifying diseases. In this book that classification has been adopted that promises to be of most service to the farmer and stockman. There still remain, however, a number of important diseases that do not fall readily under any of the preceding heads, and these are now placed together here.

AZOTURIA

There seems to be no established common name for this disease of horses, although the term "bloody water" is sometimes applied. Azoturia is a form of poisoning resulting from high feeding and lack of exercise. It always occurs in horses that are in good flesh or fat, when they are exercised after standing in the stable for one or more days. The blood seems to be loaded with nitrogenous waste material which the excretory organs are unable to throw off when the horse is exercised, and a peculiar form of paralysis and poisoning results.

A horse in good flesh, after standing in the stable for a day or more, is taken out and seems to be in excellent spirits; but after going a short distance, varying from a few rods to a mile or more, he goes lame or stiff in the

hind parts, often humping the back in a peculiar way. He sweats profusely, there is a trembling of the muscles, and he moves with much difficulty, gradually losing control of his hind parts and "going down," often before he can be returned to the stable; he struggles to rise, but is unable to do so. The affected muscles of the loins and hips are swollen, tense and rigid. The urine is turbid and dark in color, varying from a reddish coffee to a very dark brown, almost black. In severe cases, there is a period of excitement that lasts a day or two, during which the horse struggles much. Azoturia varies in severity, from a slight lameness that soon passes away, to severe cases when death takes place in a few hours.

Place the horse in warm, comfortable quarters. If he can stand after being assisted to his feet, he should be kept standing even if slings must be used. If he cannot be got on his feet, he should be placed in a comfortable position and well bedded to prevent his doing injury to himself. Attendants should exercise care to avoid being hurt by the animal. The horse should be warmly clothed, and rugs wrung from hot water placed over the affected parts and changed every half hour. A purge of six to eight drams of aloes should be given as a ball. During the period of excitement, bromide of potash in half-ounce to ounce doses may be given every five hours. Citrate of lithium in dram doses, three times daily, is good. The horse should be given all the water he wants, and an ounce of sweet spirits of niter twice daily to stimulate the kidneys. After the excitement has passed, iodide of

potash in dram doses three times daily in place of the bromide may be given. During the early stages of the disease no food should be allowed, but after a day or two thin bran gruels and a little hay may be offered. If the horse is down, he should be turned every twelve hours. Recovery comes slowly; in the meantime tonic medicines should be given, such as powdered nux vomica in one-dram doses three times daily. It is usually necessary to draw the urine with a catheter. In some cases there is lameness and a dragging of the leg that persists for some time, but finally disappears

RETENTION OF URINE

Diseases of the urinary system are not common in the lower animals. One that is popularly supposed to be rather frequent is inability to pass urine. It is common to see a horse stand stretched out as if to pass urine, and not be able do so. This symptom is often associated with colic, and is one of the most common symptoms of indigestion. In spasmodic colic, when the cramps cease the horse often passes some urine, but the retention of urine is rarely the cause of the cramps. In all cases in which inability to pass urine is suspected, medicines that will increase the amount of urine, such as spirits of niter and saltpeter, should be avoided.

Horses often refuse to pass urine on the street or hard floor or while in the harness, and will often retain it until it causes uneasiness. In such cases, if led on a pile of straw or other similar material, the animal will pass the urine voluntarily. When it is

retained for other reasons, a veterinarian should be called. It is often necessary to pass a flexible tube into the bladder to draw the urine away.

STONE IN THE BLADDER

In horses and steers, rarely in other animals, there are sometimes found one or more hard lumps of material commonly called "stones" or "gravel." They may occur in the bladder, the kidneys, or in the duct leading from the bladder to the outside, called the "urethra." The stones or gravel are composed of salts, usually containing lime, deposited by the urine in the form of concretions. They vary in size from that of shot to the size of an egg, but in most cases they are small and irregular in form. They are technically called "urinary calculi."

The symptoms vary, but in general there is irritation and difficulty in passing urine, the animal standing and straining after passing it. The urine often contains a little blood or mucus. If the bowel is emptied by an enema, the stones can sometimes be felt if the hand is passed into the rectum and applied to the bladder, which lies just below. Calculi in the urinary system appear to be common in some localities and rare in others. The reason for this is not definitely known, but is thought to be associated with an excess of mineral substances in the food or water.

When the calculi are small, in the form commonly called "gravel," laxative food and a change of drinking water, together with a dram of citrate of lithium in the

water once daily, will often remove the concretions. In case the calculi are large or cause much irritation, the best treatment is to remove them surgically. In mares this can easily be done in most cases by passing a "goosebilled" forceps into the bladder through the urethra, crushing the calculi and removing the pieces. In males it is necessary to make an incision into the urethra just below the anus, and to pass the forceps into the bladder through this incision. A skilled surgeon should be employed to perform the operation.

FOUL SHEATH

In some males, especially wethers, steers and geldings, there is sometimes an accumulation of material from the glands of the skin of the sheath, which often hinders the free discharge of urine. This deposit may dilate the sheath and by retaining urine increase the trouble. The sheath may be distended with a decomposing mass of material that greatly annoys the animal, and causes a general debility through the absorption of the poisons resulting from it.

The hair or wool should be clipped away, and if necessary an incision should be made from the entrance of the sheath backward in order to make a free opening and to remove the irritating material. Wash thoroughly with warm water and soap, and afterward apply white lotion. In geldings the sheath and penis should be greased with fresh lard or vaseline. In cattle and sheep, it is often necessary to treat several times before the parts return to their normal condition.

PARALYSIS OF THE PENIS

This condition most frequently occurs in aged horses and is due to debility of advancing age. It may also occur in serving stallions from injury or debility. In old horses the only treatment is to amputate the penis. In other cases, the cause should be sought and removed; this to be followed by a course of tonic medicines and nutritious food. Give Fowler's solution (of arsenic), beginning with one-dram doses in the feed once daily and increasing one dram daily until half an ounce is given in the feed three times a day. One dram of pulverized nux vomica seed in the feed three times a day is good.

FREQUENT URINATING IN MARES

Some mares have a most disagreeable habit of passing small quantities of urine and often switching the tail at the same time. Such mares are usually of a nervous temperament; and the vice is most likely to occur when the animal is irritated or in heat.

In some cases, when the animal is not badly affected, allowing her to raise a colt will cause the difficulty to disappear, although it is difficult, as a rule, to get such mares to breed. In other instances, the removal of the "clitoris," a small organ just inside the lower part of the vulva, will stop the trouble. In bad cases, the best treatment is to spay the mare. Usually this will stop the vice, but sometimes it will not.

DROPSY

Dropsy is known by the collecting of watery fluid in some part of the body, either in a cavity, as the abdomen, or by infiltration into the tissues. Usually dropsy is due to a weakened circulation, or to general debility.

There is swelling of the part without inflammation or particular pain. If the fluid is in a cavity, the fact is readily determined by the enlargement and its watery contents. When the fluid infiltrates into the tissues, there is pitting of the part on pressure, the pits remaining for some time after the pressure is removed. The circulation in the part is usually poor, and the region is colder than normal.

A mild dropsical condition is commonly called "stocking" or "stocks." In this case the horse's legs swell, usually after standing in the stable during the winter season. The swelling disappears on driving or exercise, but returns on standing.

The first thing to be done is to restore the circulation in the part. In some cases this can be accomplished by removing some abnormal pressure that interferes with the blood supply. Hand-rubbing, bathing with hot water and gentle exercise are good. Some medicine should be given to stimulate the kidneys to carry away the excess of fluid, such as saltpeter in ounce doses for an adult horse once daily for three or four days. A variety of nutritious laxative food, to nourish the animal and keep the bowels open, is important. Tonic condition powders in the feed are excellent. The aim is to bring the animal to a vigorous condition.

Some cases of dropsy are due to chronic organic trouble, and are likely to be serious. The cause of the original disease is to be sought and removed, when the dropsical condition usually disappears.

"BIG LEG," LYMPHANGITIS

"Big leg" is an inflammation of the lymphatic glands, usually of the hind legs. In some respects it resembles "stocking," but it is much more severe and usually affects the whole system. This disease is also called "milk leg," especially when it has become chronic and the leg is permanently enlarged. Lymphangitis is most frequent in heavy draft horses, or in coarse plethoric individuals, but it may occur in any horse.

The disease is likely to occur after a short period of idleness. It usually begins with a chill, which is followed by a fever. The temperature may go to 105°, depending on the severity of the attack. The affected leg is swollen and tender, the horse is often able to bear but little weight on it, and manipulation, especially on the inside, causes pain. The lymphatic glands and vessels extending down on the inside of the thigh are swollen, cord-like and tender. The pulse is full and throbbing, respiration rapid, appetite lost and the bowels constipated.

In chronic cases, the leg becomes permanently enlarged, the inflammation subsides, and the animal suffers little inconvenience except from the immobility of the leg. This condition is called "elephantiasis."

A purgative of six to eight drams of aloes should

be given, to open the bowels freely; the kidneys may be stimulated by giving an ounce of saltpeter once daily for three days. The leg should be bathed with hot water for twenty minutes at a time three times a day, and thoroughly rubbed until dry; then an ointment,—two ounces of gum camphor dissolved in eight ounces of fresh-melted lard,—should be well rubbed in. Iodide of potash, in dram doses, given once daily for three days is excellent. Horses subject to this disease are said to have "humors in their blood." The disease often resembles farcy.

LOCO DISEASE

Loco is a disease attacking horses, cattle and sheep in the great plains region, due to the eating of two plants, commonly called "loco weeds," *Astragalus mollissimus* and *Oxytropis Lambertii*, both belonging to the natural family Leguminosæ. These plants, characteristic of the great plains, attain a height of six to twelve inches; the leaves are compound; and the leaflets and stems are covered with a fine pubescence, which gives the plant a gray or silvery appearance. Of the two plants, the astragalus is the more common in the southern part of the great plains, while the oxytropis predominates in the northern region. Other closely related plants are perhaps also called loco plants.

The name "*loco*" is from the Spanish, and signifies crazy. It takes its name from the fact that animals that acquire the habit of eating the plant act as if insane or foolish, and they are said to be "locoed."

Animals usually begin to eat the loco plants during the winter and spring, when other food is scarce. Loco weeds remain somewhat green throughout the winter season, and, though they do not seem palatable at first, yet animals eating them under force of circumstances soon acquire the taste, and afterward will leave other food to go in search of them.

As soon as animals acquire a taste for loco, they lag behind the herd or wander away in search of their favorite food. They will often remain by themselves in localities where loco weed is abundant, and may go several days without water. They crop it close to the ground, often getting a portion of the root. Having acquired a taste for the loco weed, the animal falls away in flesh rapidly, and, as the difficulty progresses, they become so emaciated that in the last stages they are unable to stand or move about, and, unless otherwise destroyed, die of starvation. In the early stages, there is general sluggishness, difficult locomotion, and a stiff and stilted action of the legs, with trembling of the voluntary muscles. If an animal lies down and then attempts to rise, several efforts may be required, and it may turn a complete somersault before gaining its feet. The head trembles violently, and the animal may hold its mouth open for a time. There is usually a peculiar, vacant stare. The animal receives impressions through the eye, but does not seem to comprehend them, and will often stand for some time staring at a familiar object, exhibiting symptoms of fear, until the true nature of the object seems to dawn upon its brain. Sometimes, although

suffering for water, it seems to be afraid to approach a tank for fear of falling in.

Locoed cattle do not shed the hair readily in the spring, and in midsummer they can be distinguished by the ragged patches of old hair which are still clinging. As the disease progresses, the animal becomes much emaciated and there is dropsical swelling of the head and legs and other dependent parts of the body.

Locoed horses exhibit the same general symptoms as cattle and sheep. They are uneasy and "weave about" when standing, and can be led or pulled along only with much difficulty. A straw, stick or shadow across the path may cause a locoed horse to sheer violently to one side or jump several feet high in order to clear the imaginary obstacle. If allowed to stare at it a few moments until it comprehends the nature of the object, it will usually pass it freely. Locoed horses are subject to fits, or "crazy spells." These fits are especially liable to occur when the animal is working and the day is warm. During the paroxysm, the animal is delirious, and may rear and plunge violently, often falling to the ground in an unconscious condition, the eyes rolling in their sockets or turning so as to expose the whites. These fits usually last but a short time. It is generally considered that a locoed horse, although deprived of the loco weed until broken of the habit, seldom amounts to anything afterward on account of its tendency to have fits. Locoed cattle and sheep do not feed well, and can be fattened only with difficulty.

It was formerly supposed that loco resulted from some poisonous substance found in the plant, but thor-

ough chemical examinations have failed to discover any poison and the general symptoms indicate that locoed animals are suffering from gradual starvation. The loco plants do not seem to possess sufficient nourishment to sustain the animal.

Animals that show a tendency to eat loco plants should be placed where they cannot gain access to them and be fed well on nutritious and easily digested food. A good tonic condition powder may be given, made as follows:

Sulfate of iron	1 ounce
Gentian root, pulverized	2 ounces
Nux vomica seed	1 ounce
Saltpeter	1 ounce

The ingredients should be thoroughly pulverized and well mixed, and a heaping teaspoonful given in the feed three times daily. Cattle and sheep should be fatted for the market.

CORNSTALK DISEASE*

In the corn-growing regions of the central and western states, it is a common practice to turn cattle into the fields after the corn has been gathered, in order to utilize the stalks that otherwise would be wasted. Frequent and heavy losses of cattle occur from what is commonly called "cornstalk disease," a disorder that occurs only under such conditions as these.

* For further information, see Report of Bureau of Animal Industry, Bulletin No. 10, U. S. Dept. of Agriculture, Bulletin No. 58, Kan. Expt. Station, and Bulletin No. 52, Neb. Expt. Station.

Cornstalk disease is most common in years when there is a heavy growth of cornstalks, and after the stalks are thoroughly dried. Attacks also appear to be associated with cold, wet storms. Younger cattle seem to be more susceptible than older ones, and the disease is most frequent when the cattle are first turned into the fields, or changed from one field to another.

The disease comes on suddenly, with few premonitory signs. The first symptom usually noticed is that the animal stands apart from its fellows and appears to be "humped up." If made to move, it does so reluctantly with a peculiar, "wabbling" gait. There is switching of the tail and kicking toward the belly. There are usually indications of delirium, and, as the disease progresses, these become more marked and associated with signs of severe pain, such as bellowing and moaning. Death usually follows within twenty-four hours. The real cause of the disease is not definitely known, but is probably due either to acute indigestion, as a result of too much coarse, indigestible food, or poisoning by some substance in the stalks. It is not caused, as often supposed, by corn-smut, or by bacteria. There is a popular belief that it is caused by impaction, but this is only a symptom of the disease.

There is no medicinal treatment that seems to be of any benefit, but the following preventive precautions will greatly reduce the losses, if carefully followed: Cattle should be well fed and watered before turning into the fields, and some laxative food, such as alfalfa or millet, fed every day. They should be turned on the stalks gradually, beginning with a half hour the first

day and gradually increasing the time as the animals become accustomed to the change of food. It is probable that several diseases are often confused under the name "cornstalk disease."

"BIG JAW," OR ACTINOMYCOSIS OF CATTLE

This disease is also called "lump jaw," and in some localities the bunches, or tumors, are called wens. Actinomycosis is due to a vegetable organism that gains entrance to the tissues, and, growing, produces a lump or tumor, which may grow to a large size. It usually occurs in the region of the head or neck. Figs. 57, 58.

The first symptom is a slight swelling, such as might come from an injury, usually appearing on the face or lower jaw. In most cases the enlargement is due to the bulging outward of the bone, the fungus causing the disease having gotten inside the bone by working its way along the roots of the teeth. As the disease progresses, the tumor becomes larger and finally breaks, discharging a thick, sticky pus, but it does not diminish much in size as a result of this discharge. It may heal temporarily, but it gradually increases in size and, later, breaks again. The teeth in the affected part often become ulcerated and the jaw sore, so that the animal is unable to chew its food properly. Actinomycosis is rarely seen in calves.

If a drop of the pus from an actinomycotic tumor is spread out thinly on a piece of glass, minute yellow specks can be seen with the naked eye. If these specks are placed under a microscope and slightly flattened,

Fig. 57. Lumpy jaw, or actinomycosis.

they will be found to be rosettes of club-shaped fungi. This fungus (*Cladothrix actinomyces* var. *bovis*) is the cause of the disease.

If the tumor is free from the bone, the best treatment is to remove it with the knife, and treat the part as a simple wound. If it cannot be removed, in many cases it can be cured by giving iodide of potash internally in

doses of one to three drams once daily, dissolved in a half pint of water. In about a week, a condition known as "iodism" is set up. This is shown by a discharge of mucus from the nose and eyes, and a scurfy condition of the skin, especially of the neck, as if bran were scattered at the roots of the hair. When iodism is noticed, the medicine should be stopped. The tumor in most cases gradually disappears, and the animal makes a good recovery. If one treatment is not sufficient, it

Fig. 58. Lumpy jaw, *Actinomycosis bovis.*

may be repeated in two weeks. An animal with a tumor that is discharging should not be allowed to run with other cattle, as the pus scattered on the food may carry the disease. In most cases, it is thought that the fungus grows outside the animal body on material that may be taken as food, and, entering a wound, is capable of growing and causing the disease.

If the tumor is not large, or is not discharging so as to affect the general health, the flesh of the animal is not considered to be dangerous for food.

Some cases can be successfully treated by making several punctures into the tumor and inserting pellets of arsenic about the size of a large pea wrapped in tissue paper. In a few days the tumor will begin to separate from the adjoining tissue and slough out. The part should be washed with antiseptics and treated as a simple wound.

RHEUMATISM

Rheumatism usually occurs in animals that are confined in damp quarters, without sufficient exercise, and especially when the food supply is not adapted to the wants of the subject. It is common in young animals, especially puppies.

The animal develops lameness, usually severe, associated with soreness of the muscles and swelling of the joints. There is often a high fever, the animal lying quietly by itself, as movement causes severe pain. As animals become old, there is stiffness of the joints and muscles that causes considerable difficulty in locomotion. There is also "cracking" of the joints when a horse first starts to move.

The animal should be placed in warm, dry sunny quarters and be warmly clad. Laxative food, or a mild purgative, should be given to open the bowels. The affected muscles and joints may be bathed with warm water, wiped dry and well rubbed with a stimulating liniment which will not blister the skin. For dogs and small animals, a teaspoonful of sweet spirits of niter in warm water may be given to stimulate the kidneys and reduce the fever. An ounce may be given to a horse, or a

heaping teaspoonful of saltpeter twice daily. Iodide of potash, in doses varying from three grains for a dog to a dram for a horse, may be given once daily, dissolved in water. The food of animals suffering from rheumatism should be carefully looked after, and a variety of laxative, easily digested, nutritious material furnished. For puppies, plenty of milk should be allowed.

"THUMPS" IN PIGS

"Thumps" is a name that is commonly applied to a peculiar spasmodic contraction of the diaphragm or midriff in young pigs. This condition is usually associated with some disturbance of the digestive system, and is likely to occur when the pigs are fed on one kind of food. Constipation and lack of exercise are often associated with this disease. Feeding the pigs too much at a time is often thought to be a cause. The real cause of the trouble is not definitely known.

The pigs are noticed to be affected with a sort of hiccoughs that is persistent, and if not relieved is likely to cause death. There is a jerking movement of the muscles of the body that causes a peculiar thump, from which the disease takes its name.

Empty the stomach and bowels by giving a purgative; this to be followed by a spare diet of laxative, nutritious food, given frequently in small amounts. Give from two teaspoonfuls to two tablespoonfuls of Epsom or Glauber salts, or one to four tablespoonfuls of castor-oil, depending on the size and age of the pig. From one to four drops of laudanum, with one or two

teaspoonfuls of aromatic spirits of ammonia in half a cup of quite hot water, will in most cases stop the jerking of the muscles. Careful attention is to be given to the subsequent feeding.

POISONING OF ANIMALS

When animals are maliciously poisoned, the drugs commonly used are arsenic (either as "white arsenic" or Paris green) or strychnine. When arsenic is used, there are symptoms of abdominal pain and irritation of the bowels, as shown by purging and straining. When strychnine is used the animal is thrown into convulsions, the muscles becoming stiff and rigid. The convulsions become more frequent, until the animal dies from suffocation.

In all cases, if the animal is seen in the early stages, vomiting should be induced, to empty the stomach of any poison that has not been absorbed. Cattle and horses cannot vomit under ordinary conditions. Vomiting can be induced by irritating the throat with the finger, or by giving a mixture of a teaspoonful of mustard in a teacupful of tepid water. If the poison is an irritant, a dose of oil and milk is excellent to move the bowels and soothe them. Any bland oil may be given rather freely. After the oil has acted, medicines to stop the pain, such as laudanum, may be given, one dram to a dog, one ounce to a horse and one to two ounces to cattle.

When strychnine has been taken, the stomach should be emptied, if possible, and medicines given to stop

the contraction of the muscles, as chloral hydrate, in dram doses for a medium-sized dog to one ounce for a horse, dissolved in plenty of water. When the spasms occur, a few whiffs of chloroform or ether will lessen their severity.

Most cases of poisoning by plants occur in the spring, when animals are first turned out to pasture and before the grass is well started. Animals will then eat plants that under other circumstances they would not touch.

Animals confined in yards or corrals, especially where weeds are starting in the spring, are very likely to eat injurious kinds. They may die from the effects of such poisoning. It is probable that poisonous substances sometimes develop in plants at particular stages of their growth, and disappear as the plants mature. It is probable, also, that animals dying from apparent poisoning may really be destroyed by a sudden change of food, especially from dry food to green ; this is true when the green food is not of good quality, and when it contains weeds and other irritating material. If an animal is hungry and the stomach contains comparatively little food, eating a large quantity of green weeds or similar material brings on acute indigestion, during which decomposition of the contents of the stomach seems to take place, and poisons are formed that kill the animal very quickly by stopping the action of the heart. In such cases, the animals usually show signs of muscular weakness, a dripping of saliva from the mouth, and great debility. They often lie down and die with scarcely a struggle. Whenever animals are to be

turned to pasture, or when there is any violent or sudden change of food, they should be well fed and watered before the change is made. They should not be turned on pastures until the grasses are well started, so that they can get sufficient food without eating weeds or other plants that usually start early and that may be injurious. Animals that are in poor condition are more liable to die from eating poisonous weeds than those in good flesh.

Among the common plants that are poisonous under certain conditions, are cockle-burs (*Xanthium*). These are poisonous when they are first starting in the spring, and have but two leaves. Severe losses among both hogs and cattle are caused throughout the middle west from eating this weed. The leaves of the wild cherry (*Prunus serotina*), especially when wilted, are also poisonous. Tansy is poisonous, although animals will seldom eat it unless starved to it; so are the roots and young sprouts of the wild parsnip, or cow-bane, jimpson weed, yarrow, laurel, buckeye, nightshade, larkspur, sumac, poison ivy, and black nightshade; also, some fungi commonly known as toadstools. These fungi include the "fly amanita" and "death-cup."

The symptoms of poisoning usually begin within twenty-four to forty-eight hours after the animals are turned on the pasture where the poisonous plants grow. The symptoms vary with the condition of the animal and the amount of the poisonous plants eaten. In general, the symptoms may be divided into two groups: (1) The first are marked by an irritation of the stomach and bowels. These are discharge of saliva in pigs,

nausea and vomiting, colicky pains, purging, bloating, and often inflammation of the bowels. (2) The other group of symptoms results from the absorption of some poisonous substance that seems to paralyze the nerve centers, especially those that control the beating of the heart and the breathing. There is great depression and muscular weakness ; the animal, if able to walk, goes with a staggering gait ; it usually lies down some time before death, and often dies without a a struggle, apparently "tired to death." There is often a peculiar vacant stare in the eyes, and sometimes delirium. In some animals, there may be a combination of these two forms of poisoning.

When animals die from poisoning as the result of irritation of the bowels, the mucous membrane of the stomach and small intestine is always congested and red, and often severely inflamed ; in fact, the whole alimentary canal shows evidence of irritation in being unusually red and with blood-vessels prominent. When death is due to some poison which is absorbed and acts upon the nerve-centers, there are practically no abnormal conditions to be found after death; although the muscle of the heart is frequently congested, giving it a striped appearance, and in some cases there may be slight irritation of the bowels. The chemical nature of the poisons which are supposed to exist in plants is not well known, very little work having been done on them, and it is practically impossible to isolate them from the other contents of the stomach in an ordinary chemical examination.

The treatment of poisoning must depend on the symp-

toms. If there is severe irritation of the bowels, give a purge of castor- or raw linseed-oil, to remove the irritating material, and follow with small doses of laudanum, to allay the irritation. Gruels and warm sweet milk containing beaten raw eggs are soothing and nourishing. To animals that can vomit, an emetic of mustard and tepid water may be given. In cases in which symptoms indicate absorbed poison, and the animal is weak and depressed, stimulants should be given, together with purgatives, to remove poisonous materials not already absorbed. Dilute alcohol or ammonia, in moderate doses, should be given frequently until danger from collapse is past. In all cases of poisoning it is a good plan to give rectal injections of warm water, to stimulate the action of the bowels and to remove their contents. When an animal is cold and weak, stimulants, such as Jamaica ginger, may be given in hot water, and the animal placed in warm quarters and rubbed vigorously.

POISONOUS FOODS

Under certain conditions, some common foods may be poisonous to animals. Sorghum, especially second growth, may cause death very quickly when animals are pastured on it; in some instances death appears to result from bloating; in other cases the animals die in a few minutes, without the formation of gas in the rumen. Little is known of the exact nature of this poison, or of adequate treatment for it, death taking place so soon that there has been practically no opportunity for investigation. Should the animal bloat, it

should be tapped at once, and treated as in ordinary cases of bloating.

Cattle are sometimes poisoned from eating quantities of flax chaff. They are often fed flax straw and chaff with good results; but fine flax chaff should not be fed alone to cattle that are not used to it; even a small quantity eaten under unfavorable conditions may cause acute indigestion and death. It should always be mixed with coarser food, and but little given at a time.

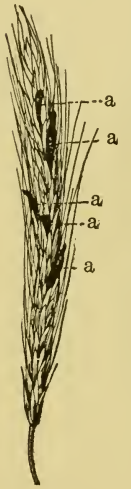

Fig. 59.

Rye, with ergot at *a* (× ½). The diseased grains are enlarged and black.

Ergotism is a chronic form of poisoning resulting from the eating of ergot. It is sometimes serious among cattle. Ergot is a fungus that attacks certain grasses, especially rye and plants known as "wild rye," causing the heads to have abnormal grains. This is commonly called "spurred rye." Fig. 59. When ergot is eaten in any quantity, it causes irritation of the bowels, colics, abortion in pregnant females, and a sloughing of the extremities, such as the feet and tail. The treatment is to remove the cause and give good laxative food.

MOLDY CORN

In the corn-growing regions of the West, in years when the corn crop is poor and the ears are small and damaged by the green corn-worm, the ear, especially

toward the tip, is attacked by mold which forms a felt-like growth. The feeding of this corn to horses, either as a grain ration or as corn-fodder, during the fall and winter, frequently causes heavy losses from a disease commonly known as "staggers," or "mad staggers," because of the prominent symptoms.

The symptoms are those of a brain disease. The animal appears to be blind and only partially conscious; there is often a tendency to turn in a circle to the right or left, with a staggering or straddling gait. There is usually trembling of the muscles. As the disease progresses, the animal becomes delirious and easily excited. In many cases the patient will stand with the head or breast against a wall or manger, and push. When badly affected, animals often will eat apparently from force of habit, not because they are hungry. In some cases they die in a few hours after they are first noticed to be ailing. Most of them die within a few days; a few live a week, rarely longer. In a few instances the spinal cord is diseased, while the brain remains nearly normal. In these cases there is inability to control the muscles, or the animal may be unusually sensitive, the least irritation of the skin, even touching the animal, often causing it to kick violently. Care should be exercised in handling a horse to avoid injury, as the animal is irresponsible and often in a delirious frenzy. Mules are rarely affected by this disease.

In some cases bunches of horses do not begin to die until a month after being turned into the stalk fields; and they may contract the disease in a week, or even ten days, after the moldy corn has been withheld.

If the spinal cord only is affected the animal frequently recovers. Laxative food should be provided, and iodide of potash in one-dram doses dissolved in water may be given once daily for three or four days. When the brain is the seat of the disease, practically all cases die, and all methods of treatment so far have proved of no value. The animal should be placed where it will be comfortable, and cannot injure itself or other animals, and supplied with soft laxative food, such as thin bran mashes. The only treatment is preventive, by avoiding the wormy, moldy corn.

When it is necessary to feed such corn, it should be shelled and poured into a tub of water; the diseased kernels will float and can be skimmed off. Cattle and hogs do not seem to be injured by eating moldy corn.

MOLDY SILAGE

In the spring, when the weather becomes warm, silage is likely to spoil unless it is in a silo of small diameter, so that it can be fed out rapidly. When a silo is first opened there is some silage on or near the surface which has spoiled. This silage should not be fed, as it may cause fatal poisoning.

In cows there is loss of appetite, constipation and weakness, followed later by profuse diarrhea and straining, then delirium and death. There is labored breathing, due to the filling of the lung tissue with gas.

In horses there is weakness, trembling of the voluntary muscles, difficulty in eating and swallowing, delirium, and, in most cases, death.

In the early stages give mild purgatives of three-fourths pound of Epsom salts, and (for a horse) a quart of raw linseed-oil, followed in both cases with stimulants, as three to six ounces of whiskey in water. When delirium or excitement begins to show, give bromide of potash in half-ounce doses, repeated every four hours. Laudanum may also be given in one- to two-ounce doses.

MOLDY OATS, HAY AND FORAGE

When fed to horses and mules, moldy oats and hay and forage are likely to cause the same trouble as described above under moldy corn. The disease is called cerebro-spinal meningitis, cerebritis, "mad staggers," or simply "staggers." The cause of the trouble should be sought and removed. The treatment is the same as for moldy corn poisoning.

Treatment for poisoning by forage of various kinds is not satisfactory, as it is difficult to relieve the animal of the injurious food, even if it has not already been absorbed. The only treatment is to give medicine according to the symptoms, since, for most of the poisons of this class, there are no known antidotes.

INJURY FROM COTTON-SEED MEAL

Cotton-seed meal is one of the most valuable of the concentrated feeds. It is rich in protein and is easily digested, but if fed to cattle in too large quantities, and long continued, it is likely to induce a disease of

the nervous system, which is shown by a peculiar vacant stare in the eyes and twitching or trembling of the voluntary muscles. The disease comes on gradually and seldom causes any loss, as it can be remedied by withholding the cotton-seed meal. In fattening cattle for the market on cotton-seed meal, it is seldom advisable to full-feed them for more than one hundred days. The symptoms described may appear after the animals have been on full feed for seventy-five days.

When swine are fed large quantities of cotton-seed meal there sometimes results a severe irritation of the bowels, which in some respects resembles hog cholera, and may cause death. There may also be indigestion and heart failure. Swine sometimes die from an excess of cotton-seed meal when following cattle in the feed yards.

DIRTY HAY

Hay that is grown on river-bottoms that are subject to overflow sometimes contains a large amount of sand and other dirt. When such hay is fed it may set up severe diarrhea, due to irritation of the bowels. The treatment is to remove the cause. Dirty or musty hay should not be fed to horses on account of the danger of digestion troubles, and its tendency to cause heaves.

LEAD POISONING IN CATTLE

Lead poisoning in cattle is rather common, and arises in most cases from licking paint from boards, drinking water from paint cans or kegs or from lead-

lined receptacles. The symptoms are weakness, prostration and purging. Treatment is not satisfactory. Stimulants are given to overcome the weakness, and after the bowels are well emptied they are quieted by laudanum (in two-ounce doses for adult cattle).

OTHER POISONS

Various materials that contain poisons are often eaten by cattle with serious results. Fatal cases are reported from bags that had contained nitrate of soda being chewed by cattle. Utensils containing Paris green are often left where cattle can drink the water that they may collect. In all cases of poisoning, all sources of possible injury should be carefully considered before malicious poisoning is suspected.

CHAPTER XVIII

RECIPES AND BRIEF ADVICE

No printed page can take the place of experience and good judgment; yet it is possible to present in brief space the general average of conclusions reached by many persons in many years. Such brief advice is here attempted, as a kind of ready reference. Whenever in doubt, consult a skilled veterinarian. If animals are worth growing at all, they are worth the advice of a man that knows.

DOSES OF MEDICINE

In giving medicine to animals, especially if the person is not familiar with the action of the drug, it is best to give small doses and repeat frequently until the desired effect is produced, rather than to give large doses.

The doses described in this chapter are for adult animals. The age, size and temperament of the animal is always to be taken into consideration. Ruminants with compound stomachs, as cattle and sheep, can take much more medicine, in proportion to their size, than animals with simple stomachs. As a rule, a cow will take about half as much again as a horse. Sheep will take about one-third as much as a horse. The dose for a good-

sized dog is approximately that for a man. Puppies must not be given large doses, especially if they belong to the small breeds. Colts one year old take about one-third the dose of an adult horse ; at two years old, about one-half the dose. The same ratio will hold with regard to young cattle.

Medicines should always be well diluted, to prevent injury to the animal. In the use of medicines, two systems of measurement are employed. For solid substances apothecaries' weight is used, the following table giving the weight and symbols:

	Symbol
1 grain	gr.
20 grains = 1 scruple	℈
3 scruples = 1 dram (or drachm)	ʒ
8 drams = 1 ounce	℥
12 ounces = 1 pound	lb.

The scruple is not often used at present in weighing medicines.

For fluid substances the following measures of capacity are used :

1 minim	m.
60 minims = 1 fluid dram	f ʒ
8 fluid drams = 1 fluid ounce	f ℥
16 fluid ounces = 1 pint	O.
2 pints = 1 quart	Qt.
4 quarts = 1 gallon	C.

In writing a prescription, if a fluid dram or ounce is intended, the letter *f* is placed before the symbol. To indicate the number of measures to be taken the letter

i or *j* is placed after the symbol, one for each measure to be used. Three ounces would be written ℥iij.

A minim is about equal to a drop, depending, of course, on the fluidity of the drug and its manner of dropping. A drop may also be estimated to equal one grain. A teaspoon holds about a fluid dram, a dessert spoon about two drams, and a tablespoon half a fluid ounce. A good-sized tumbler holds about half a pint, or eight ounces. Teacups hold from six to eight ounces.

Acetic Acid (see *Vinegar*). Pure acetic acid is used to remove warts. Soak warts well with it.

Aconite Tincture. Horses, 10 to 20 drops; cattle, 20 to 30 drops; sheep, 10 drops; dogs and pigs, 1 to 5 drops. Good for fevers and inflammations, but should not be given when heart action is weak. Applied externally, it relieves pain, but should be used in small amounts. Poisonous.

Alcohol, Whiskey, Brandy. Doses from 1 dram to 4 ounces, depending on size and age. Should be largely diluted with water. Good for chills, depression and collapse, or when the animal is very weak.

Aloes. Horses, 5 to 8 drams; cattle, 1 to 1½ ounces. Give as a ball. In small doses, 1 dram, it is a bitter tonic for horses and cattle.

Alum. Horses, 1 dram; cattle, 3 drams; sheep, ½ dram; pigs, ¼ dram. Used for diarrhea. In solution, used for sore mouth.

Alum, Burnt. Dusted on old sores and proud flesh.

Ammonia Water. Horses, ½ ounce; cattle, 1 ounce; sheep, 2 drams; pigs and dogs, ½ to 1 dram. Dilute

with water. Good in indigestion, colic, bloating and as a stimulant. Externally, used in liniments.

Arnica Tincture. Horses, ½ to 1 ounce; cattle, 1 ounce; sheep, 2 drams; pigs, ½ dram. Causes sweatings and lessens fever. Externally, mildly stimulating to skin.

Arsenic (Fowler's Solution). Horses, 2 to 4 drams; cattle, 4 to 6 drams; sheep and pigs, 5 to 20 drops; dogs, 1 to 5 drops. Given as a tonic in chronic diseases and in heaves. Give in food, or after eating.

Asafœtida, Gum. Horses, 2 drams; cattle, 4 drams; sheep, 1 dram. Give in a ball.

Asafœtida, Tincture. Horses, 2 ounces; cattle, 3 to 4 ounces; sheep, ½ ounce; pigs and dogs, 1 to 2 drams. Good for colic, indigestion, constipation and worms.

Belladonna, Fluid Extract. Horses, ½ dram; cattle, 1 dram; sheep, 20 drops; pigs, 3 drops; dogs, ¼ to 3 drops. Good in fevers, cramp colic, tetanus and caked bag. Do not repeat doses frequently.

Blue Stone (Sulfate of Copper). Antiseptic astringent and mild caustic. Used externally on wounds, either dusted on or in solution, 1 ounce to 1 pint of water, or stronger if necessary.

Boric Acid. Non-poisonous antiseptic. Used for sore mouth, sore eyes, roup and to inject into udder. Used in solution, 20 grains to 1 ounce of water.

Butter of Antimony. Used pure on swab as a caustic, to burn out proud flesh, old sores and fistulæ. Not used internally.

Calomel. Horses, ½ to 1 dram; cattle, 1 to 2 drams;

sheep and pigs, 5 to 20 grains. General purgative, and used to expel worms. Externally, dusted in old sores to dry up and heal them.

Camphor. See *Spirits of Camphor*.

Cantharides. See *Spanish Flies*.

Carbolic Acid. Used as antiseptic to hasten healing of wounds and sores; also as disinfectant. Dissolve 1 part of acid in 30 parts of water. Poisonous.

Castor-oil. Horses, 1 to 2 pints; sheep, 4 ounces; pigs, 2 ounces; calves, 2 to 4 ounces. An excellent purgative. Small doses, combined with laudanum, excellent for scours.

Charcoal. Finely pulverized is used in condition powders and dusted on wounds. Hogs like charcoal to eat.

Chloroform. Given by inhalation to produce anæsthesia. Must be given dogs very carefully or it will kill them. For colic in horses, 1 dram given with laudanum is excellent.

Copperas (Sulfate of Iron). Horses, 1 dram; cattle, 2 drams; sheep, 20 grains; pigs, 10 grains. Excellent tonic in debilitated conditions and diarrhea. Useful in condition powders.

Corrosive Sublimate (Mercury Bichloride). Used externally as antiseptic and disinfectant. Dissolve 1 part in 1,000 parts water. As a caustic, 1 part corrosive sublimate dissolved in 50 parts alcohol and add 50 parts water. Used to swab out fistulæ. Very poisonous.

Creolin. Antiseptic, disinfectant and valuable to destroy parasites. Used in solution 1 part Creolin to 100 parts water.

Epsom Salts. Purgative for cattle and sheep. Cattle take 1 to 1½ pounds; sheep, 2 to 4 ounces, dissolved in warm water.

Ether, Sulfuric. Given by inhalation to produce anæsthesia. For colic in horses, 1 dram given with laudanum is excellent.

Fowler's Solution. See *Arsenic.*

Gentian Root, Powdered. Horses, 2 drams; cattle, 4 drams; sheep, 1 dram. Bitter tonic used in condition powders.

Ginger. Horses, ½ ounce; cattle, 1 ounce; sheep, 2 drams; pigs, 1 dram. Good in flatulent colic and as a tonic.

Glauber's Salts. Cattle, 1 to 1½ pounds at dose; sheep, 2 to 4 ounces. Dissolve in water and give as a drench. An excellent purgative for ruminants.

Glycerin. Two to 4 ounces in water makes an excellent enema (injection). Externally, softens and soothes irritated parts.

Iodine Tincture. Used externally to kill ring-worm and to reduce enlarged glands, wind-puffs, etc. Should be painted on once daily until part begins to get sore. Inject into old sores and fistulæ once in eight days.

Jamaica Ginger. Horses, 1 ounce; cattle, 2 ounces; sheep, ½ ounce; calves and foals, ½ ounce. Give in milk. Good for diarrhea and as a stimulant.

Kerosene. Internally, good for stomach worms. Give lambs 1 to 2 drams in sweet-oil. Externally, is mildly irritant. Rub it in well.

Lard. Used fresh to rub on irritated skin, softens and soothes. Internally, given as a purgative to small

animals. Melt and give from 1 to 8 ounces, according to size.

Laudanum. Horses, 1 ounce; cattle, 1 to 2 ounces; sheep, 2 drams; dogs and pigs, 5 to 20 drops. Relieves pain, colic and diarrhea. Externally, relieves pain.

Lime Water. Made by slaking fresh lime, allowing it to settle and using the clear water. Useful in diarrhea of young animals. Dilute their milk one-third with lime water. Finely pulverized air-slaked lime is good to dry up sores by being dusted on.

Linseed-oil, Raw. Horses, 1 to 2 pints; cattle, 2 to 3 pints; sheep, ½ pint; calves, 4 to 8 ounces; lambs, 2 ounces; dogs, ½ to 2 ounces. Purgative and soothing. Do not choke animal in giving. Externally, 1 part carbolic acid to 25 parts oil, for scratches in horses.

Mercury. See *Corrosive Sublimate* and *Calomel.*

Mustard. A heaping teaspoonful in 4 to 6 ounces of warm water is an excellent emetic for dogs and pigs. Mixed with warm water to a paste and applied to skin, it blisters. Used as a blister in lung diseases.

Niter. See *Sweet Spirits of Niter.*

Nux Vomica (Powdered Seed). Horses, ½ to 1 dram; cattle, 2 drams; sheep, 20 grains; pigs, 10 grains. Used in paralysis or weak, debilitated condition. Useful in condition powders. The active principle is strychnine, and when twitching of muscles occurs medicine must be stopped. Poisonous.

Oak-bark Decoction. Boil 1 ounce of bark in 1 pint of water. Colts and calves, 1 to 2 ounces; lambs, ½ ounce. Give in milk. Can double dose, if necessary.

Good for diarrhea. Externally, dries up sores and toughens skin.

Peppermint Essence. Horses, 20 drops ; cattle, 30 drops ; sheep, 10 drops ; pigs, 5 drops ; dogs, 2 to 5 drops. Good in indigestion and colic. Give in sweetened hot water.

Quinine. Horses, ½ to 1 dram; cattle, 2 to 4 drams; sheep, ½ dram ; pigs, 10 grains ; dogs, 1 to 5 grains. Reduces fever. Stimulates, and in small doses is bitter tonic.

Salts. See *Epsom* and *Glauber's Salts*.

Salt, Common. Useful as food in small quantities. Solution of 1 ounce salt to 1 pint water is good for sores and wounds. Give all animals a little salt in food.

Saltpeter (Nitrate of Potash). Horses, 1 ounce ; cattle, 1 to 1½ ounces ; sheep, 2 drams. Reduces fevers and dropsical swellings. Stimulates the kidneys. Externally, dissolved in water, is cooling lotion.

Soda Bicarbonate (Baking Soda). Horses, 1 ounce; cattle, 2 ounces ; sheep, ½ ounce ; pigs, 2 drams. Useful for indigestion. Give before feeding.

Spanish Flies (Cantharides). Pulverized and mixed with 6 to 8 parts of lard is used as a blister. Not given internally.

Spirits of Camphor. Horses, 2 to 4 drams ; cattle, 1 ounce ; sheep, 2 drams ; dogs and pigs, 10 drops to ½ dram. Give with water. Good for colic, diarrhea, coughs, and to lessen pain. Checks milk secretion. Externally, good to relieve pain and sprains.

Sugar of Lead. Used externally to heal sores and

wounds. Dissolve 1 ounce in 1½ pints water. Used in white lotion as follows :

Sugar of lead	1 ounce
White vitriol	6 drams
Water	1 pint

Shake well before using.

Sulfate of Copper and **Iron.** See *Blue Stone* and *Copperas.*

Sulfur. Cattle and horses, ½ ounce ; sheep, 1 dram; pigs, 20 grains. Dusted in hair useful against lice and mites. Not often used internally. Ointment, 1 part sulfur to 6 parts lard, good for lice. Sulfur is often burned in closed empty room to disinfect. Set vessel containing burning sulfur in a larger vessel filled with water, to prevent danger from fire.

Sweet Spirits of Niter. Horses, 1 to 2 ounces ; cattle, 2 to 3 ounces ; dogs and pigs, ½ to 2 drams. Give in water. Stimulant, and acts on kidneys. Good in cramp colic, and in small doses reduces fever.

Tincture Chloride of Iron. Used for sore mouth and sore throat. Use ½ ounce tincture of iron to 8 ounces of water.

Tobacco. Not given internally. Externally, a decoction is good for mites and lice. Use it weak.

Turpentine. Horses, ½ to 2 ounces ; cattle, 2 to 3 ounces; sheep, 1 to 3 drams ; pigs, 1 dram; dogs, 5 to 30 drops. Give in oil, gruel or milk. Good for colic, bloating and intestinal worms. Stimulates the kidneys. Externally it is an irritant. Used in liniments.

Vaseline. Softens and sooths parts. Used as a base for ointments.

Vinegar. Used externally as a cooling, stimulating lotion. Can be used hot. Internally, in small doses diluted with water, for cooling fevers.

Whiskey. See *Alcohol*.

COMMON PRESCRIPTIONS

Absorbing Ointment

Crystals of iodine	½ dram
Iodide of potash	½ dram
Lard	1 ounce

Mix them thoroughly into an ointment. This is excellent for removing enlargements. It is to be rubbed in well once daily until the part begins to get sore; then withhold for a day or two, and repeat.

Colic Mixture

Laudanum	4 ounces
Aromatic spirits of ammonia	3 ounces
Sulfuric ether	½ ounce
Essence of Jamaica ginger	4 ounces

Add water to make a pint.

From two to three ounces of this can be given in a teacupful of hot water. The second dose can be given in one-half hour to one hour, and repeated an hour later. Always dilute the medicine with water, not enough to scald the animal.

Fly Blister

Gum camphor	½ ounce
Cantharides	2 drams
Lard	2 ounces

The camphor and cantharides are to be pulverized and mixed with the lard. The blister is to be well rubbed in for four to ten minutes, depending on the severity of the blister required.

RED BLISTER

Gum camphor	½ ounce
Biniodide of mercury	2 drams
Lard	2 ounces

Pulverize and mix well. Rub in from four to eight minutes.

COUGH MIXTURE

Fluid extract of belladonna	½ ounce
Pulverized opium	½ ounce
Gum camphor, pulverized	2 drams
Ammonia chloride	½ ounce

Add molasses and flour to make eight ounces of paste. With a small wooden paddle daub a teaspoonful on the back teeth three or four times daily.

DRYING POWDER. HEALING POWDER

Air-slaked lime, finely pulverized	12 parts
Tannic acid, pulverized	1 part

This is excellent for summer sores, galls, and any raw surface. The powder is to be dusted on frequently.

SOOTHING LOTION

Laudanum	2 ounces
Aconite tincture	1 ounce
Soap liniment	5 ounces

This liniment is to relieve pain and soreness in

part where there is much inflammation. It will not blister. It is good for sprains, etc.

LINIMENT

Aqua ammonia . . . . . 1 ounce
Turpentine . . . . . 1 ounce
Linseed-oil . . . . . 6 ounces

Mix and apply by rubbing. The bottle should be kept well corked. If a stronger liniment is desired, a little more turpentine and ammonia may be added. This will blister if used freely and rubbed in, especially if it is covered to prevent evaporation.

LINIMENT

Dissolve one-half ounce of gum camphor in eight ounces of alcohol, add one dram of oil of sassafras, then add eight ounces of concentrated aqua ammonia. Keep in a bottle with a glass or rubber stopper. This is an excellent liniment and will blister if used freely.

WHITE LOTION

Zinc sulfate (white vitriol) . . . . . 6 drams
Lead acetate (sugar of lead) . . . . . 1 ounce
Water . . . . . 1 pint
Shake well before using.

White lotion is used extensively for wounds, sores, scratches, summer sores and fistulæ. It can be applied three times daily.

OINTMENT, OXIDE OF ZINC

Oxide of zinc . . . . . 1 ounce
Benzoated lard . . . . . 4 ounces

Mix well together. Used externally for dry, angry-looking sores. An excellent healing ointment.

Purging Ball

Pulverized aloes, from five to eight drams, according to size of horse. Mix it with molasses and add pulverized ginger root to make a stiff dough, wrap it in oiled tissue paper and give as a ball. The horse should have bran mashes for two or three meals previously to giving this ball. Aloes is also used as a tonic medicine (see page 430).

BRIEF ADVICE ON THE COMMONER DISEASES *

Abortion. Burn or bury deep the fœtal calf and membranes. Clean and disinfect the stall, and isolate the cow from other pregnant cows. Wash out the uterus and vagina with a solution of one part of creolin to 100 parts of water as long as there is any discharge. Do not breed healthy cows to infected bulls. Page 374.

Abscesses. Poultice the part, or bathe with hot water, until pus can be detected ; then open at the most dependent part, to give free drainage. Wash out with warm water and use antiseptics, such as one part of carbolic acid in 30 parts of water. Inject once daily, keep the part clean and the hair greased below the wound. Page 166.

Afterbirth (retained). Wind the free part on a stick, oil or soap the hand and arm, and, holding the

*For lists of diseases of the various animals, see Index.

stick in the left hand, insert the right hand into the uterus, loosen the afterbirth with the fingers and remove. Page 206.

Anthrax. Isolate and vaccinate healthy animals. Burn dead animals or bury them deep, and disinfect thoroughly. There is no medicinal treatment. Quarantine against the disease, and exercise care that persons do not become infected. Page 360.

Black-leg. Remove the well animals from the infected quarters or pasture and vaccinate them. Purge the sick and give them exercise. Stimulants and laxative foods should be given. Page 362.

Bloating in Cattle. If very bad, tap at once. Put gag in mouth and give salt. Dash cold water on body, and blanket. Give turpentine in two-ounce doses in milk as a drench, baking soda in two-ounce doses, or a dose of salts, about one pound for an adult. Page 260.

Bog Spavin. Apply iodine as tincture or ointment, or an absorbing ointment, until parts get sore, then withhold. Put pressure on part by truss or bandage. Hand-rubbing is good. Page 238.

Bone Spavin. A high-heeled shoe on affected leg, lower on the inside. Blister the spavin and give rest. If a bad case, fire and blister. Page 227.

Bronchitis. Comfortable quarters, with plenty of fresh air. Clothe the body warmly. Give sweet spirits of niter in ounce doses in early stages ; later give aconite in fifteen-drop doses and belladonna in thirty-drop doses, alternating every two hours. Be careful, in drenching, not to get medicine into lungs. Page 280.

Bunches, or Enlargements. Treat as bog spavin. Light blisters are also good. Page 226.

Burns and Scalds. A strong solution of baking soda, to relieve the pain. One part of carbolic acid to fifty parts of linseed-oil or vaseline.

Caked Udder. Bathe in hot water, wipe dry, and rub in an ointment of one part of gum camphor dissolved in eight parts of melted lard. Support udder with suspensory. Give saltpeter internally in one-ounce doses twice daily for three days. Page 210.

Choking. Work obstacle up, if possible; if not, work it down by manipulating from outside. A gag in the mouth of cattle, with salt on back of tongue, is good. Push obstacle down with probang, or with rubber hose with a rope drawn through to stiffen it. As a last resort, cut in and take it out. Page 255.

Colic. Allow the horse to roll, but prevent his injuring himself. Give colic remedy or baking soda in tablespoonful doses in hot water as a drench. Essence of peppermint in tablespoonful doses, or essence of Jamaica ginger in two-ounce doses, or laudanum in one-ounce doses, all to be given in hot water. Examine the diet for the cause. Page 266.

Constipation. Give a dose of castor-oil, to small animals from one-half to two ounces. For large animals, give from one to two quarts of raw linseed-oil. Follow this with laxative food and moderate exercise. Look for the cause of the difficulty. Page 275.

Corns. If there is "matter," open, wash out with antiseptics and keep clean. Relieve the pressure on the part and protect with a bar shoe. Page 97.

Curb. Put on a high-heeled shoe, blister lightly, and repeat in four weeks if necessary. Give the horse rest. Page 241.

Drunk on Apples. Give cows small (¼-pound) doses of salts, followed by stimulants. Whiskey in four-ounce doses with hot water, aromatic spirits of ammonia in two-ounce doses in water, or essence of Jamaica ginger in two-ounce doses in hot water.

Eversion of Uterus. Wash off, return and hold in place by two or three stitches through the lips of the vulva. Put on a rope truss, to help hold stitches. Give laudanum in one-ounce doses to stop straining; also tie a small rope around body in front of hind legs for same purpose. Page 207.

Farcy. See *Glanders*.

Fleas. Wash animal with solution of one part creolin to fifty parts of water, or use tar soap with warm soft water, and leave lather on for ten minutes or more. Insect powder is good. Page 318.

Fouls in Cattle. Clean out cleft between toes, apply turpentine and dust in finely pulverized air-slaked lime. If fouls is of long standing and bad, poultice the foot, clean out well, cauterize with butter of antimony applied with a swab, and dust in calomel. Keep feet clean and dry. Page 303.

Founder. See *Laminitis*.

Fractures. If fracture can be treated and the animal is worth it, put on splints after getting the bones in proper position. Keep the animal quiet and give a variety of laxative food. Page 217.

Galls. Remove the cause and keep the parts clean

and dry. Wash three times daily, and apply white lotion; then dust on finely pulverized air-slaked lime. Oxide of zinc ointment is good.

Glanders. Isolate the horse until disease is diagnosed, then destroy the horse and bury it deep or burn. Disinfect stables, utensils and equipment. Care is to be exercised not to contract the disease, as it is fatal to man. Page 356.

Heaves. Wet the food and give easily digested, but not bulky, kinds. Tonic condition powders. Fowler's solution of arsenic in half-ounce doses in the food once daily for ten days. Careful feeding and dieting give good results. Page 286.

Hoven. See *Bloating*.

Hydrophobia. See *Rabies*.

Impaction of the Rumen. Give small doses of oil with linseed or flour gruel. Small doses of stimulants are good. As a last resort, cut into the rumen on the left side and remove the contents. Close up the rumen with fine stitches of catgut, and sew up the muscles separately. Give only milk and gruels for ten days after the operation. Page 259.

Indigestion. Give a mild purgative of oil or salts, followed by small doses of Jamaica ginger and tonics. Feed sparingly with laxative, easily digested food. Diet the animal for a time. Look for the cause and remove it. Page 264.

Inflammation of the Bowels. Give a dose of castor- or raw linseed-oil, followed by laudanum to quiet the pain. Page 271.

Inflammation of the Eye. Look for foreign bodies,

lime in the form of white-wash, and remove, if present. Bathe with warm water or apply cold in the form of cracked ice. Wash out the eyes with a solution of boric acid, twenty grains to the ounce of water. Page 308.

Knuckling. In adult horses, remedy by shoeing. In colts, wrap the parts with soft bandages and apply splints. Most colts will outgrow it. Page 235.

Laminitis, or **Founder.** Pull off the shoes and apply poultices, or wrap the feet well with cloths wet in cold water. Induce the horse to lie down, if possible. Give saltpeter internally in ounce doses dissolved in water as a drench three times daily. Give mashes to loosen the bowels. For chronic sore feet, a bar shoe with a rubber cushion between frog and shoe, gives relief. Page 93.

Lice. Insect powder dusted in the hair or feathers. Kerosene emulsion, or a solution of creolin one part to fifty parts of water. Give salt and sulfur to the animal to lick. Feed well and keep clean. Clean and disinfect the quarters and apply hot coal-tar to cracks, corners, roosts, etc. Page 314.

Lockjaw, or **Tetanus.** Place the horse in dark, quiet quarters, and do not disturb. Open and disinfect the wound. Use a solution of one part of glycerin, one part of water and two parts of pure carbolic acid. Inject one dram with a hypodermic syringe every two hours beneath the skin of the neck or shoulders for forty-eight hours, then once in four hours. Do not drench. Give milk and gruels, with raw eggs, to drink. Page 291.

Maggots. Clean the wound and remove all scabs

and dead tissue. Apply pure creolin. Kerosene is also good. Page 328.

Milk Fever. Get cow into comfortable quarters and keep her propped up on her brisket. If cow can swallow well, give a small dose of salts as a drench. Give the Schmidt treatment. Dash cold water on the cow, rub briskly and blanket warmly. Give enemas to empty the bowels. Do not drench with medicines. Page 212.

Poisoning. If there is irritation of the bowels, give raw linseed-oil. If there is weakness, give stimulants, and when there is pain or convulsions, give laudanum or vapor of ether inhaled, to quiet. Page 417.

Punctures of Foot. If pus has formed, cut away the hoof and open freely and inject antiseptics. Keep foot clean and dry. Protect with a bar shoe as it heals. Page 100.

Quarter Crack. Draw the crack together with nails and clinch. Apply tar to keep out the dirt. Blister the coronet lightly. Page 101.

Rabies, Hydrophobia. Destroy the animal. Persons should take the Pasteur treatment. Page 367.

Ring-bone. Fire, blister and give rest. Page 231.

Ring-worm. Iodine either as tincture or ointment. Turpentine or pure creolin. Page 313.

Scouring. Give a dose of castor- or linseed-oil, followed by laudanum in doses of a teaspoonful to calves to an ounce for a horse and two ounces for large cattle. Jamaica ginger in hot water. Dilute calves' milk with one-fourth limewater. Dried blood, in teaspoonful doses, is good. Look for the cause of the trouble and remove it. Page 273.

Scratches. Clip the hair, poultice, clean well and apply white lotion, then oil or vaseline. Carbolic acid, one part in twenty parts of linseed-oil. Keep parts clean, dry and well oiled. If bad, cauterize after poulticing. Page 301.

Sore Mouth. Swab out the mouth with the same solution as for sore throat. Give soft foods. Page 246.

Sore Throat. Give gruels and soft foods. With a syringe, force half an ounce of the following solution into the back part of the mouth every four hours: Tincture of iron, one ounce; water, one pint. Rub a stimulating liniment on the outside of the throat. Page 254.

Splint. In most cases, let alone. Lower the inside quarter to take the weight off splint. Put a light blister over the part. Page 233.

Sprains. Bathe the part with hot water, to relieve the inflammation. Applications of cold water are good. After the inflammation has subsided apply liniments. If lameness continues, blister lightly. Page 238.

Stifle. Replace stifle by putting a strap around fetlock, draw the leg forward and push bone into place. Blister the part. Keep the leg forward and the horse standing for forty-eight hours. Page 235.

Stomach Staggers. Let the horse rest. Give a ball of aloes, to empty the bowels. Diet the horse, and do not drive rapidly soon after feeding, while the stomach is filled with food. See that the harness does not interfere with the breathing or circulation of blood to the head. Page 258.

Sunstroke. Get the animal into the shade, dash

cold water on the head or apply cracked ice to the poll. Loosen the harness and give plenty of fresh air. If there is much depression, with a weak, thready or irregular pulse, give stimulants, as whiskey in four-ounce doses well diluted with water. Page 297.

Swollen Legs. Give a purge to empty the bowels, and ounce doses of saltpeter to adult horses once daily for three days to stimulate the kidneys. Allow moderate exercise. Page 406.

Tetanus. See *Lockjaw.*

Texas Fever. Keep susceptible cattle from tick-infested ground. Remove ticks from susceptible animals. Give laxative food, such as green corn and sweet milk. Page 370.

Ticks. Keep cattle off infected ground. Scrape off ticks with dull knife. Grease with carbolized lard, vaseline or crude petroleum. Use Christian's dip. Page 336.

Thoroughpin. Wind-puffs. Treat same as bog spavin. Page 239.

Wolf Teeth. Extract with forceps. Page 251.

Wounds. Stop the bleeding and close the wound by stitches, with plasters or by means of a bandage. First remove all foreign bodies from the wound, and treat with antiseptics. Wash daily and use antiseptics, but do not disturb more than necessary. If proud-flesh forms, use a caustic to burn it out; when there is much discharge from the surface, use a healing powder of one part tannic acid to eight parts pulverized air-slaked lime. Page 158.

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